DIESEL PROGRESS

INCORPORATING GAS TURBINE PROGRESS

DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES

FIVE DOLLARS PER YEAR

JULY, 1959

FIFTY CENTS PER COPY

The service history of these pistons, removed from a diesel locomotive engine, shows how Texaco Dieseltex assures long-lasting operation. In little less than 5 years, these pistons had provided more than one million miles of operation without parts replacement.

Whether your diesels run on rails, in buses or trucks or are stationary, Texaco lubricants assure dependable operation. Example:

These pistons are free from wear and scoring—even after 1,031,963 trouble-free miles

You can see how the complete set of railroad diesel pistons shown above has been kept clean and protected from wear. This is true even though it's been through a million miles—and almost five years of service—without any parts replacement. The lubricant used to keep the pistons clean was Texaco Dieseltex.

There are Texaco lubricants to protect power in *all* diesels—both moving and stationary—these two ways: 1) Detergent-dispersive action keeps pistons and all other engine parts clean. 2) High film strength prevents wear and scoring by keeping an unbroken film between moving parts. This film is maintained even under severe conditions, throughout a wide range of operating temperatures.

For more information, just call the nearest of the more than 2,000 Texaco Distributing Plants or write:

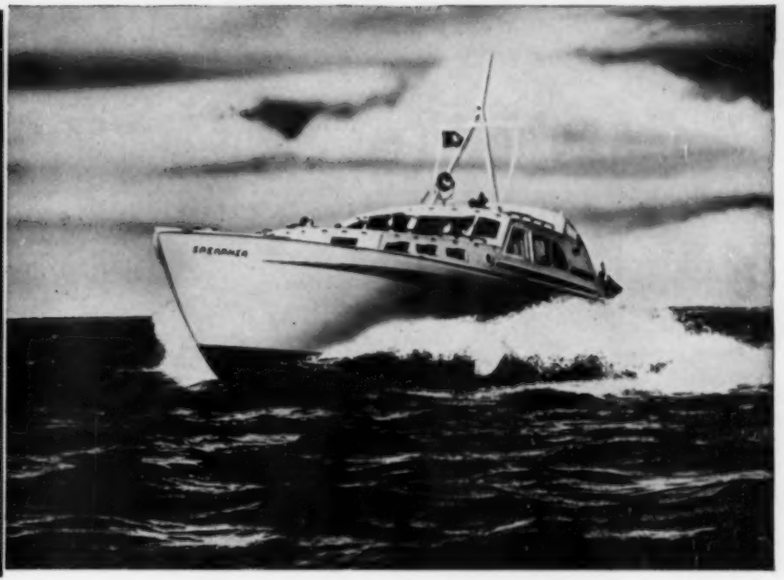
Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

CONSTANT PROGRESS IN OIL'S FIRST CENTURY

MINIMUM DEPOSITS —NO SCORING after more than a million miles of service lubricated exclusively with Texaco Dieseltex HD.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



VERSATILITY + POWER + UNEQUALLED PERFORMANCE

PERKINS POWER FOR ALL DIESEL APPLICATIONS

* 26 years of diesel design and manufacture.
* Powers from 11 to 120 b.h.p. at 1,000 to 4,000 r.p.m.
* Engines that will do any job faster, cheaper and more efficiently than any comparable power unit.
* World-wide service and spares facilities.

Whatever your power problem you will find the answer in the PERKINS RANGE OF DIESEL ENGINES.

Perkins HIGH QUALITY DIESELS

. . . FOR AUTOMOTIVE, AGRICULTURAL, INDUSTRIAL AND MARINE APPLICATIONS

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1786

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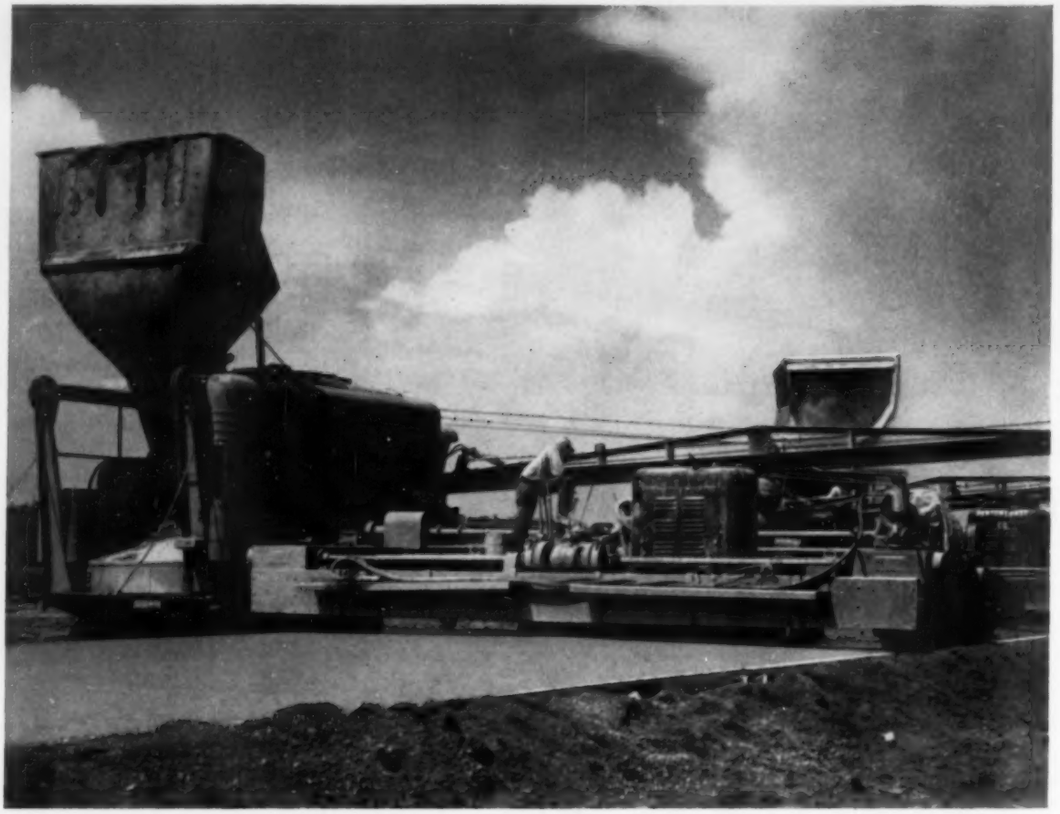

HARRISON-cooled Diesel power paves the way for new record of 6,029 feet of 9-inch concrete highway in 12½ hours

Harrison Heat Exchangers —Top-Quality Products of General Motors Research and Engineering.

You're always on the right road with Harrison! Whether you're unfurling a ribbon of highway in record time . . . or maintaining around-the-clock, heavy-construction schedules, Harrison takes complete control of vital operating temperatures. For example, a stretch of concrete 24 feet wide, 6,029 feet long and 9 inches deep was laid in 12½ hours, using Harrison-cooled Diesel power for the Rex pavers and portable batch mixing plant. Harrison heat-transfer equipment is rugged, reliable and highly efficient. That's why leading manufacturers specify Harrison heat exchangers for *all* types of Diesel applications. Harrison meets every cooling challenge with over 48 years' experience in the heat-transfer field. So, if you have a cooling problem, look to Harrison for the answer.

TEMPERATURES MADE TO ORDER

HARRISON

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

GM GENERAL MOTORS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

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FRONT COVER ILLUSTRATION

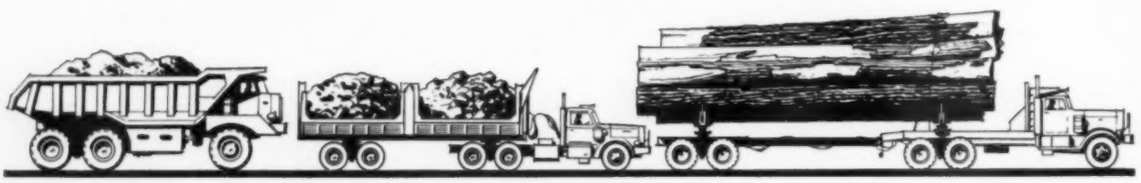
This is one of 32 Diamond T tractors used by the Wagoner Transportation Co., Muskegon, Mich., to haul petroleum products. It has a Cummins NH-220 diesel engine, Fuller R-960 RoadRanger transmission, Timken front and rear axles, and Spicer 14-in. clutch.

NEW, RUGGED... HI CAPACITY...

5-G-1220 Heavy-Duty, 5-Speed TRANSMISSION

LONGER LIFE *with pressure filtration and lubrication*
EASIER SHIFTING *with countershaft brake*

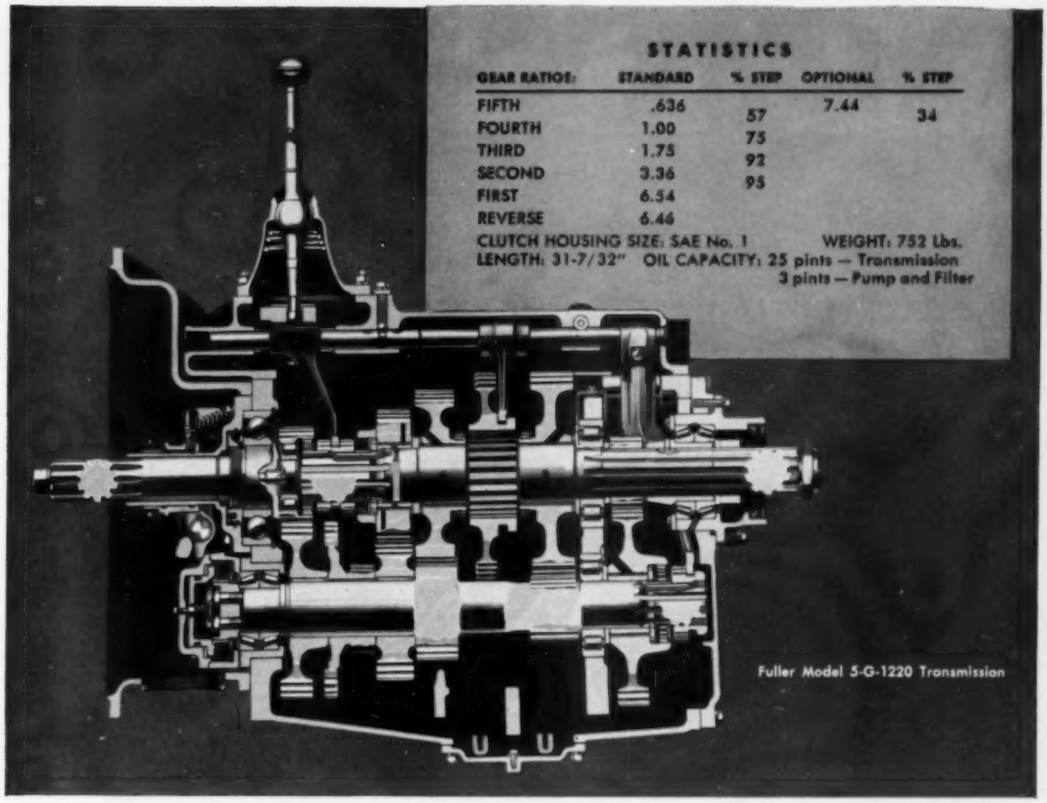
...for TOUGH



The Fuller model 5-G-1220 Transmission is engineered for heavy-duty operation in big earthmoving, logging, mining and quarrying equipment, including prime movers pulling scrapers of 12 to 14 cubic yards capacity. This new model is also designed for off-highway service in trucks equipped with engines of equivalent torque and horsepower.

Model 5-G-1220 offers higher capacity than other models in the '1220 series previously produced through elimination of axial thrust factors by the use of spur type gearing throughout the unit. As standard equipment

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.
Automotive Products Company, Ltd., Brock House, Langham Street, London W.1, England, European Representative


STATISTICS
GEAR RATIOS: STANDARD % STEP OPTIONAL % STEP
FIFTH .636 57 7.44 34
FOURTH 1.00 75
THIRD 1.75 92
SECOND 3.36 93
FIRST 6.54
REVERSE 6.46
CLUTCH HOUSING SIZE: SAE No. 1 WEIGHT: 752 Lbs.
LENGTH: 31-7/32" OIL CAPACITY: 25 pints — Transmission
3 pints — Pump and Filter
Fuller Model 5-G-1220 Transmission

off-highway service!

on the 5-G-1220, the following innovations are featured:

1. Pressure lubrication and filtration system;
2. Countershaft inertia brake.

The pressure lubrication and filtration systems provide positive lubrication of the mainshaft pilot bearing and mainshaft gear bushings, keep the gear oil clean between changes, and prolong gear and bearing life. The air powered countershaft brake, which is activated simply by pushing a button, permits quick upshifts without double clutching.

Both high production and reduced operating costs for off-highway jobs can be secured by using the 5-G-1220 Transmission. Ask your equipment dealer for further information about this unit, or write directly to the Fuller Manufacturing Company, Kalamazoo, Michigan.

FULLER TRANSMISSION DIVISION
MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

Here's why your fleet customers specify Purolator Air Filters as original equipment

"We've saved thousands of dollars in maintenance costs by preventing dirt damage to our engines," says Mel McLure, Shop Supt., Yellow Transit Freight Lines, Inc. He specifies Purolator dry-type air filters exclusively for Yellow Transit's fleet of 302 Kenworth line haul tractors.

This quote points out one way to increase chances of repeat business. Your engines will last longer in the field, and his maintenance costs and down-time will be cut sharply, when you've built Purolator dry-type Micronic® air filters into his diesels.

Here are some of the reasons why so many fleet operators insist on Purolator Micronic air filters as original equipment:

- They are more than 99% effective at all engine speeds.
- Their controlled porosity keeps all harmful particles from reaching the vital parts of the upper engine.
- They are easy to maintain and replace.

Think about these benefits when you consider Purolator air filters for original equipment in your own, standard line of diesels.

A Purolator engineer will be glad to show you how the advantages and economies of Purolator filtration, provided for your customers, can also be of benefit to you. Write or call for a demonstration. When you do, be sure to ask for the booklet, *Purolator Micronic Dry-Type Air Filters.*

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

ELLIOTT TURBOCHARGERS INCREASE ENGINE POWER 50%

Unmatched Turbocharger Experience

Elliott, with 18 years of turbocharger background, has more experience in this field than any other manufacturer in the United States. Elliott covers the whole field of turbocharged engines.

Turbocharging gets more power out of any diesel or gas engine. Alcoa's Point Comfort plant had long been using Nordberg vertical radial engines to power pot lines (242 of them; 162 of these drive Elliott generators).

Turbocharging these engines took a little working out, but it resulted in increasing power output from 1330 to 2000 kw per engine.

ELLIOTT Company

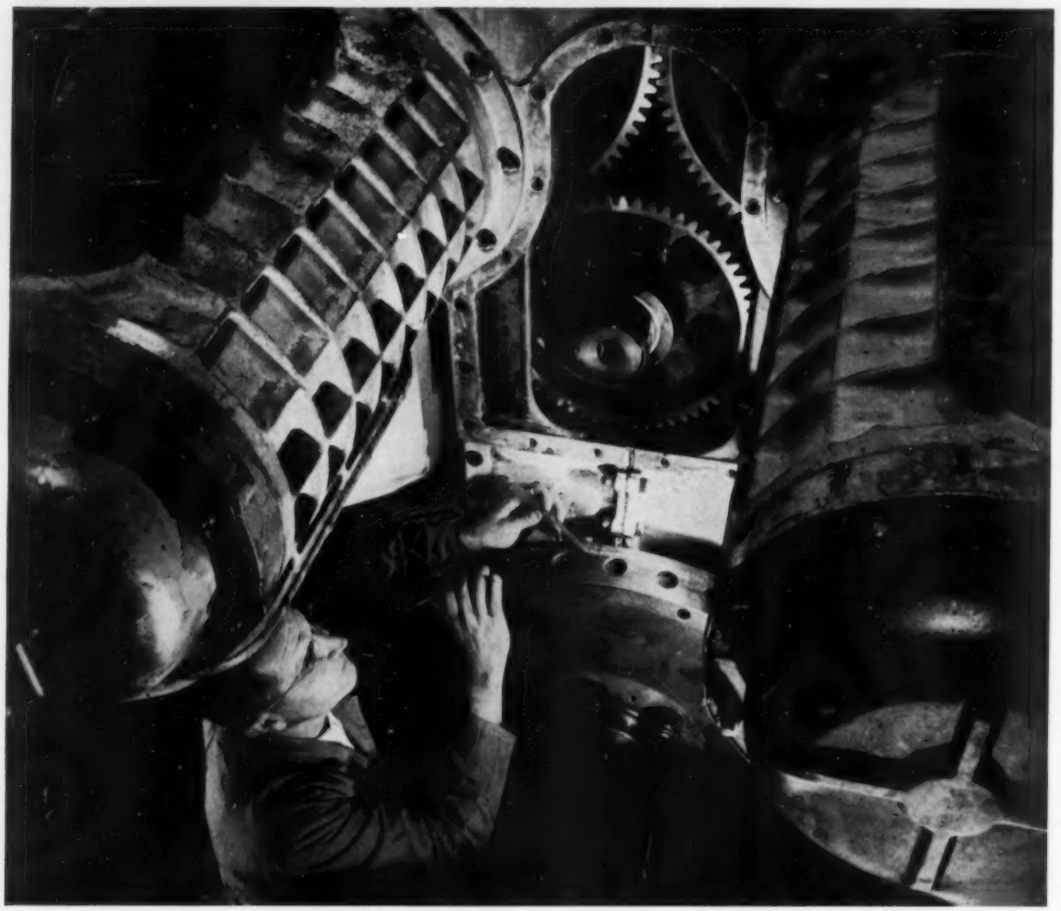
TURBOCHARGER DEPARTMENT, JEANNETTE, PENNSYLVANIA

M9-2

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

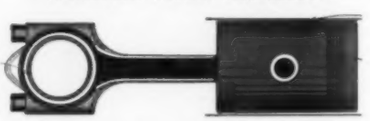
FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

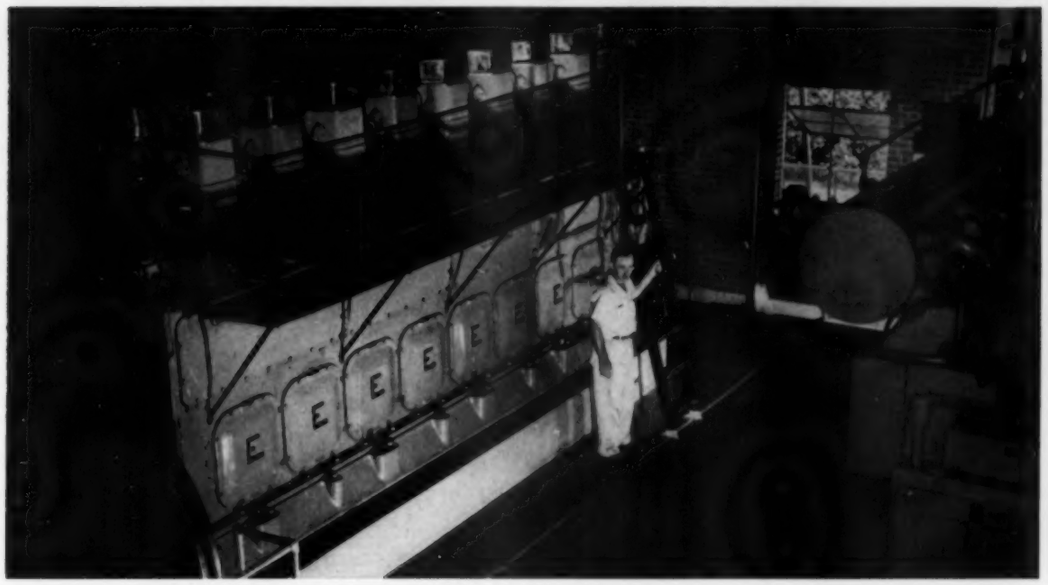
LUBRICATING OILS RPM DELO

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "RPM DELO" AND DESIGN REG. U. S. PAT. OFF

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey
STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

"Our Municipal Power Plant Started the Real Growth of Our Town"*



**Says Charley Hubbard, Plant Superintendent, El Dorado Springs, Missouri*

"Our first Enterprise engine was installed 12 years ago and has been in continuous use ever since. It's been run almost 42,000 hours, has developed 17,865,000 kw hours, and still has all of the original rings. We feel that this is an excellent record and would certainly recommend Enterprise Engines for any stationary installation."

The El Dorado Springs story doesn't end with this fine testimonal to Enterprise dependability. Equally gratifying is the effect of its progressive power program on the town itself. Dependable power at reasonable rates has attracted new industry. And, now that the bonds are being paid off, the plant supplies free lighting for streets and park; free power for the water plant and for sewage disposal; even free lights for the town's annual Christmas decorations.

Enterprise specializes in engines for stationary and portable electric power generation, flood and water pumping systems, and sewage plant power. Versatile fueling provides important operating economies. You can specify engines equipped for diesel, dual fuel, tri-fuel or spark-ignited gas. Models range from 73 to 7703 HP. For complete information and an expert analysis of your power plant problem, call your nearest Enterprise office or write us direct.

DEPENDABLE ENGINES

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engine & machinery co.

Subsidiary of General Metals Corporation
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SPICER 4-SPEED
AUXILIARY TRANSMISSION

A deep underdrive *plus* a splitter for a faster pull up any grade

Now . . . with the Spicer 4-speed auxiliary transmission . . . you can equip your vehicles with the right ratio for every grade, whether on or off the highway.

In the same dual-purpose gearbox, there's a deep underdrive — for added pulling power — and a splitter ratio that speeds up the long pull. As a further advantage, the use of the splitter gear avoids engine lugging under almost any condition and makes it easier to keep engine RPM in the most efficient range for greater fuel economy.

For convenience in gearing up, the Spicer 4-speed auxiliary is directly interchangeable with present 3-speed auxiliary transmissions. Companion flanges, drive shaft length and shift lever controls can all remain the same.

As an added option, the 4-speed transmission is offered with a top-mounted power take-off capable of transmitting full engine torque. Or, where lightweight design is desired, you can order the Spicer 4-speed transmission with an aluminum case . . . saving 80 lbs. of weight.

For further specifications, write the Dana Corporation, Toledo 1, Ohio, and mention the vehicle you're planning to gear up.

DANA Spicer

DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

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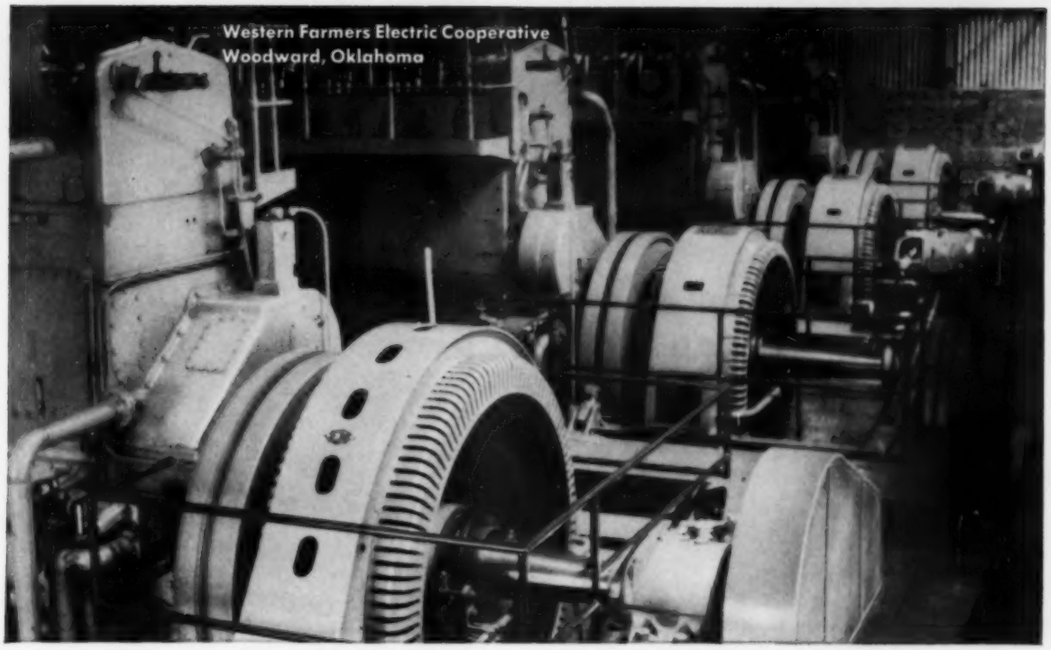
RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Ltd., Merritton, Ont.



8 years with same pistons; cylinder wear .005 using Cities Service DC-940 Oil

Nordberg engines roll up over 44,000 hours with minimum wear, no lubrication problems.

Frequently running at 77% of plant capacity, Western Farmers Electric Cooperative is getting newsworthy service from its eight year old Nordberg engines and Cities Service DC-940 Oil.

Three of its four engines have piled up over 44,000 hours each . . . and two of these three still have the original piston rings! Average cylinder wear is .005, and horsepower hours per gallon of lube oil are running as high as 14,000!

Says Plant Superintendent H. P. Wingo: "In the entire eight years we've been using Cities Service DC-940, downtime for maintenance has been almost nonexistent and we've never had a lubrication problem of any kind. Thanks to this kind of performance, we continue to hold one of the highest REA power efficiency ratings."

If you're looking for a lube oil capable of increasing horsepower hours per gallon—an oil properly fortified to prevent oxidation and engine wear—get the facts about Cities Service DC Series Oils. Talk with a Cities Service diesel lubrication specialist from the nearest office. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Supt. H. P. Wingo and Assistant Supt. Harold Conley keep Western Farmers Electric Cooperative high among REA power efficiency ratings. Both credit Cities Service with a major assist.

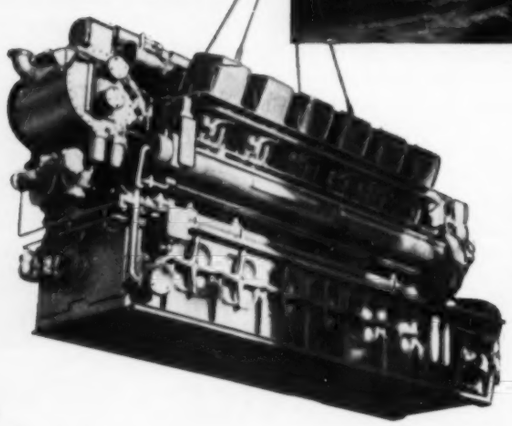
For The Record . . . And What A Record! Often at 77% capacity, Western has operated its Nordbergs for eight years with absolutely no lubrication problems using Cities Service DC-940. 14,000 h.p. hrs. per gallon is common.

TWO NORDBERG DIESELS REPOWER RAILROAD CARFERRY

BEFORE: 43 year old steam powered railroad carferry Ann Arbor No. 6, before conversion.

AFTER: The modernized M/V Arthur K. Atkinson, now 34 feet longer, with an increase in speed of 50%, and her capacity increased from 24 to 28 loaded freight cars.

. . . speed increased by 50 per cent without increasing engine room space



View shows one of the two Nordberg type FS-1312-HSC main propulsion diesel engines being lowered into the engine room of the "Atkinson". Each engine drives a KaMeWa 12' dia. controllable reversible pitch propeller, through a Westinghouse single reduction vertical off-set gear having a ratio of 3.6:1. This provides the 2550 normal rated horsepower at 130 shaft rpm, and 2850 shp at 135 rpm.

As dramatically illustrated by the "before" and "after" views, Manitowoc Shipbuilding Co. has accomplished a notable reconstruction job on the newly named *M/V Arthur K. Atkinson*, operated by the Ann Arbor Railroad Co., which is controlled by the Wabash Railroad.

Formerly known as the *Ann Arbor No. 6*, and powered by two 1300 hp steam engines, the 43 year old hull has now taken a new lease on life with the two Nordberg turbocharged 12-cylinder V-type diesel main propulsion engines, each with a normal rating of 2550 shp at 468 rpm.

Named for the Chairman of the Board of the Wabash Railroad, the *Arthur K. Atkinson* is now in service crossing Lake Michigan, between Frankfort, Mich. and the ports of Kewaunee and Manitowoc, Wisconsin . . . *and is making these runs in one-third less time than she did with steam power.*

While too early to establish definite cost comparisons, the two Nordberg diesels are bearing out the original cost studies and doing the job more economically.

This Great Lakes vessel modernization is another good example of the ability of Nordberg marine diesel engines to "breathe new life" into existing hulls. Count on Nordberg experience to solve *your* next power problem—dependably, economically.

NORDBERG MANUFACTURING COMPANY • Milwaukee 1, Wisconsin

ATLANTA • CLEVELAND • DALLAS • DULUTH • HOUSTON • KANSAS CITY • MINNEAPOLIS • NEW ORLEANS • NEW YORK • ST. LOUIS
SAN FRANCISCO • TAMPA • WASHINGTON • TORONTO • VANCOUVER • JOHANNESBURG • LONDON • MEXICO, D. F.

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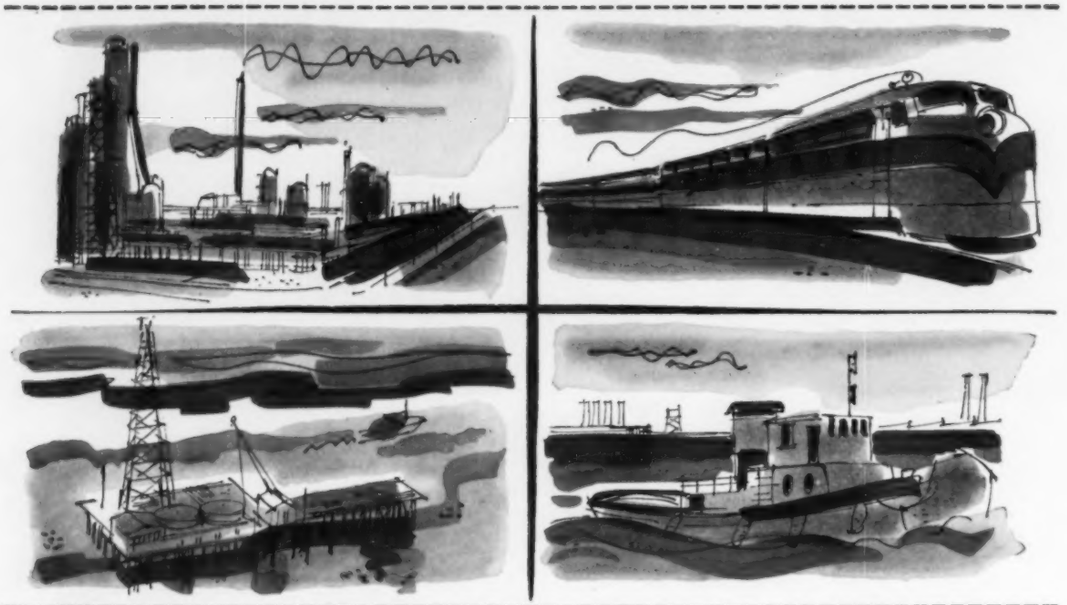
SM759

FOR THE LONG RUN . . .



it's KOPPERS Piston Rings

Where profit depends on keeping equipment in service, engineers recognize the importance of ring performance. That is why Koppers Piston Rings go into the finest engines in the world . . . why they are selected for replacement when better performance is demanded.

Since the first diesel engine, Koppers has produced piston rings of predictable performance in a complete range of materials and a wide selection of types and sizes. If you have a ring problem, Koppers can offer you the benefit of their experience. Write to: KOPPERS COMPANY, INC., Piston and Sealing Ring Department, 4207 Hamburg Street, Baltimore 3, Maryland.

Send now for Koppers recommended Piston Ring Set-Ups applicable to the engines which you operate.

KOPPERS

PISTON AND SEALING RINGS

Engineered Products Sold with *Service*

Dale Hickerson, Walter Arnold (mechanic), Al Hancock and Don Bronson, regular drivers and crew of the Autocar—Hall-Scott Million-Miler.

HALL-SCOTT ENGINE LOGS 1,000,000 MILES ON $544 OF REPLACEMENT PARTS

Million-mile service from a truck engine without major overhaul is unusual in itself. But when the cost of replacement parts for that mileage is only $544, such service is a real tribute to the engine and the men who operate and maintain it.

No wonder Petrolane Gas Service, Inc. of Long Beach, California held a special dinner to honor the three drivers and mechanic who operated the Autocar truck and its Hall-Scott LPG power plant for 1,000,000 miles without a chargeable accident. In addition to its over-the-road mileage, a third of which was on mountainous terrain, the truck's engine put in 3,564 hours on unloading pump drive for LPG cargo.

Many other Hall-Scott engines have passed the million-mile mark . . . and there will be many more. In fact, a unique Million-Mile Club has been formed of operators owning these long-serving power plants: note the certificate at left.

If you'd like to know more about these money-saving engines, write Hercules or any of its distributors coast-to-coast.

HERCULES ENGINES
. . . Sold and Serviced the World Over

HERCULES

HERCULES MOTORS CORPORATION
Canton, Ohio

Serving THE DIESEL INDUSTRY
WITH A New Approach
SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA
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Marine Gears
TWIN DISC
Condensed Specifications
TWIN DISC FRICTION and FLUID DRIVES
Get UNBIASED answers to your power transmission problems
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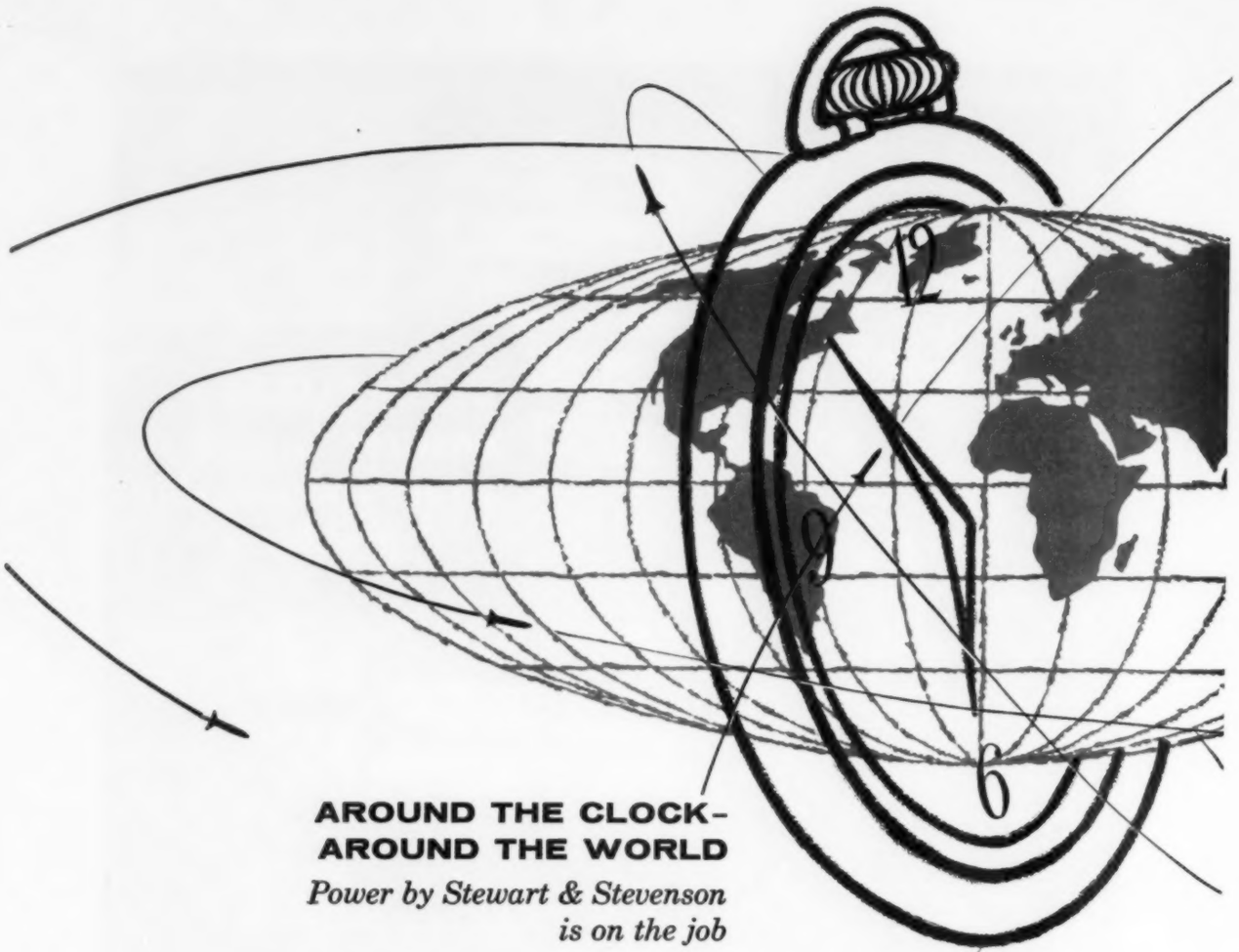

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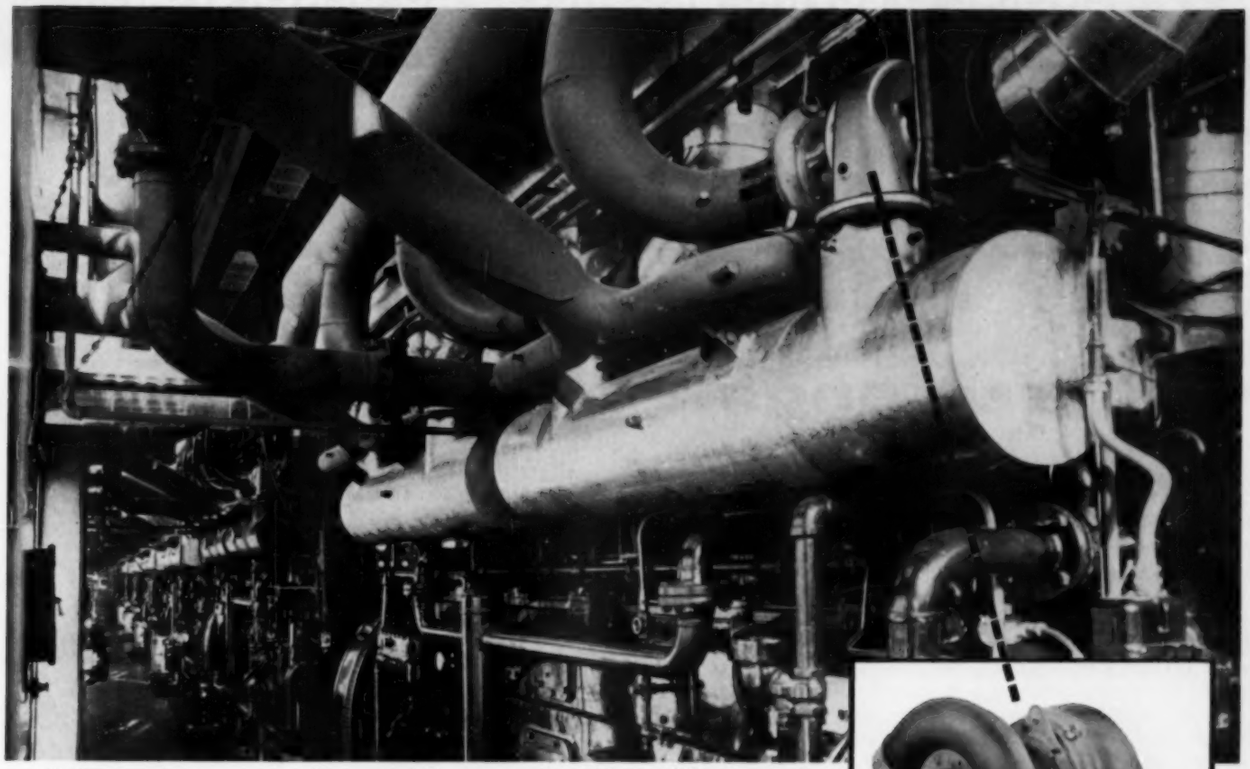

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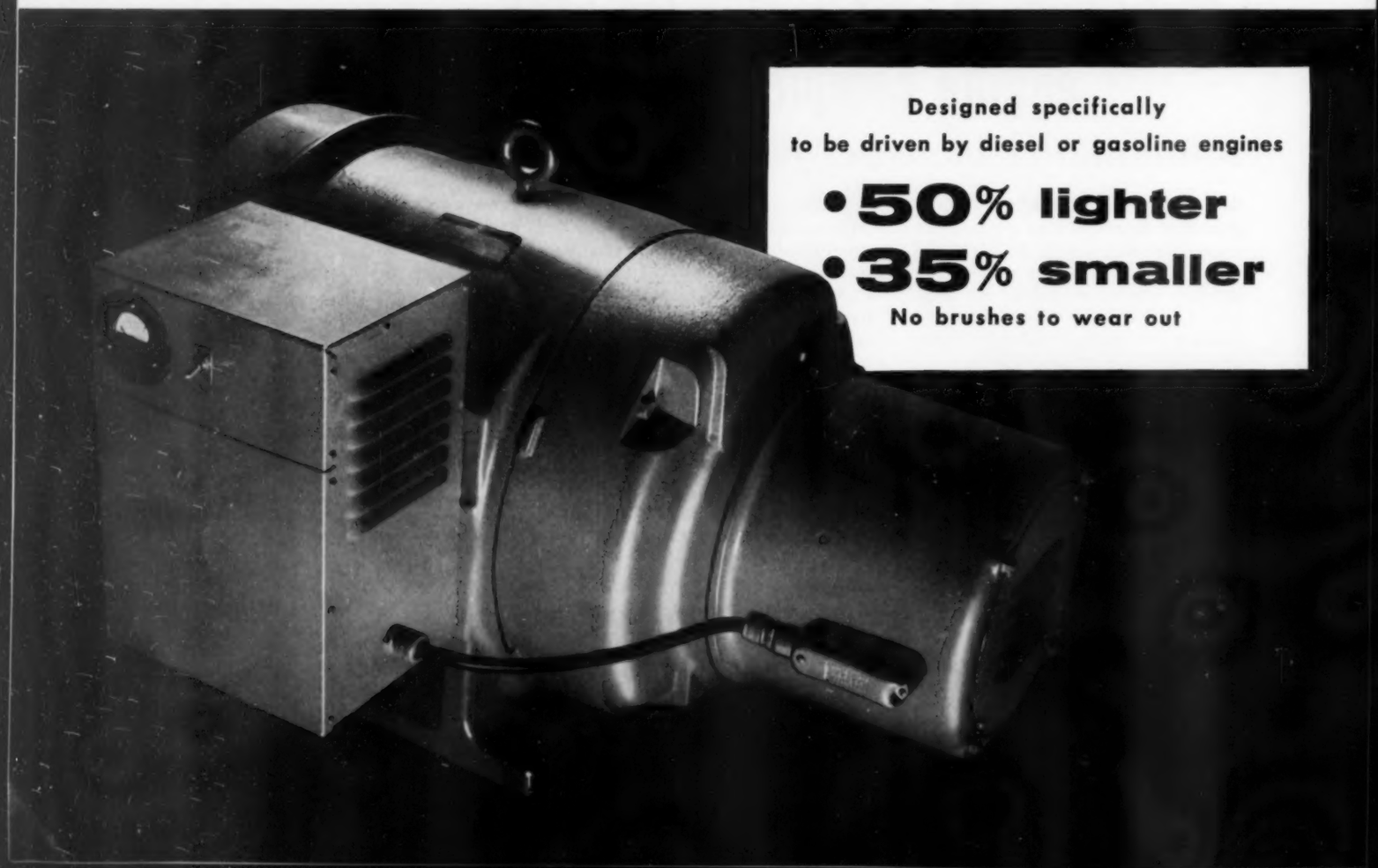


John Vogel Inc., tandem rig approaches a New York Thruway toll gate. Mack tractor has 335 hp Cummins and as of May 15, had operated 24,180 miles. Luber-finer oil filter is used.

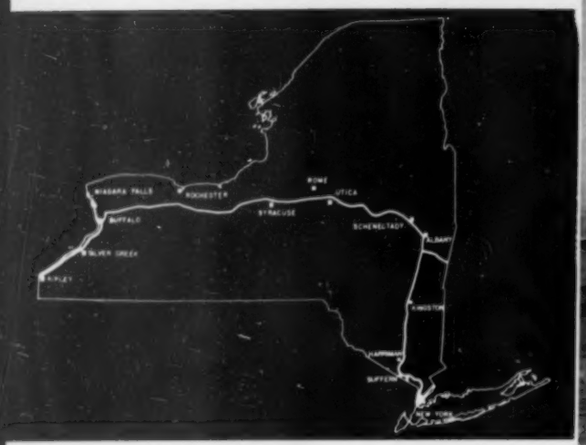
The first of Denver-Chicago's two Internationals takes the Thruway in stride. All units in the test have two drivers.

TANDEM-TRAILER TESTS SHOW COST REDUCTION

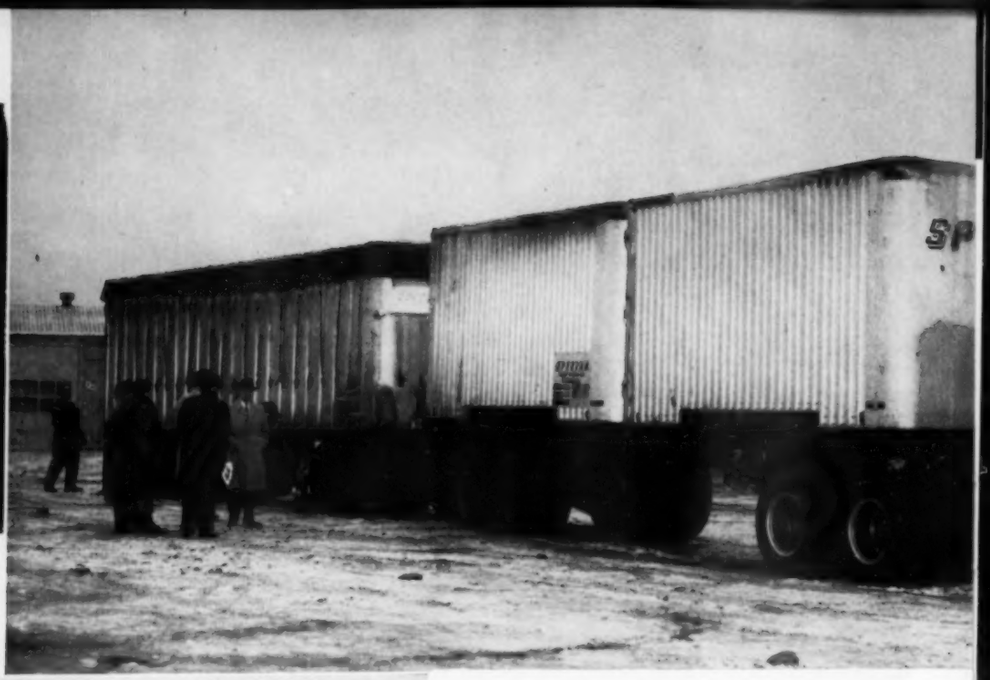
DOUBLE-BOTTOM tractor trailer test runs currently underway on the New York State Thruway and the Massachusetts Turnpike appear to be winning approval in all quarters. The tests represent a double-barreled program to cut operating costs of over-the-road freight carriers, and increase truck traffic and revenues on these eastern toll roads. In the tests 12 Cummins diesel tractor-trailers, up to 98 ft. in length and hauling up to 127,400 lbs. gross weight, are being operated by the following six major trucking companies (number after company name is units in service: C & E Trucking Corp. of Saugerties, N. Y. (3); John Vogel Inc. of Albany, N. Y. (1); Red Star Express Lines of Auburn Inc., Auburn, N. Y. (1); Denver-Chicago Trucking Co., of Denver, Colo. (2); Spector Mid-States of Chicago, Ill. (2); and the Western Express Co. of Cleveland, Ohio (3).

Reports in from officials of some of these trucking companies point to substantial savings and turnpike officials find favorable comment to the tests. This can well be expected because it is no secret that the turnpikes and thruways are not producing the revenues expected. Important too, there are indications that these tests will be instituted along other toll roads in the very near future. Toll for the tandem-trailers is 10 cents a mile, double the rate for a single Class 7 tractor-trailer combination. Commenting on the tests, Albert De Roose, executive director of the Affiliated Truckers Association of New York State said, "We are proud that this historic development in the trucking industry has been innovated on the New York Thruway. This is not an overnight development, rather a program planned for a long time with a view to reducing shipping costs and consumer costs. This new method of hauling means that shippers, shopkeepers and consumers will be able to obtain more goods more economically. It promises to increase trade for all of New York State."

From the trucker's point of view the goal is to have one higher horsepower diesel tractor do the work of two regular units, while at the same time reducing weight over two conventional units. In addition, total space occupied on the thruway is reduced to 98 ft. as compared with 400 ft. required



Map of the New York Thruway. Opened in part in 1954, it now covers 539 miles. Last 20 mile section due for completion in 1960.



Spector Mid-States "double-bottom" was photographed shortly after tests began in Feb. In addition to this International, Spector is also operating a White tractor. Both are powered by turbocharged Cummins Thruway engines.

Red Star Express Lines is operating this single Mack unit between Suffern and Syracuse on the Thruway.

for two 50 ft. units safely separated by 300 ft. In placing their units in service, all trucking firms are using experienced drivers with outstanding safety records. The twin trailers have special braking devices and distribution of weight is improved so that the "doubles" reduce the pounds per square inch of tire. The better weight distribution is obtained by a dolly—a special set of axles under the front of the second trailer and attached to the rear of the first trailer.

Of the twelve units operating in the test runs, five are International Harvester, four are Mack, two are White and two, Autocar. With the exception of two International tractors operated by Denver-Chicago, all of the units are powered by the Cummins NRTOL Thruway engine, a four-cycle, six-cylinder turbocharged diesel incorporating higher output components that is rated 335 hp at 2100 rpm. The two Denver-Chicago engines are the Cummins NH-220 which were field-equipped with Garrett AiResearch turbochargers. Either Fuller 8, 9 and 10-speed RoadRanger transmissions or Spicer 12-speed transmissions are used with the exception of the Mack trucks which employ the manufacturer's 15-speed Triplex transmission.

Mr. John Vogel, Jr., president of John Vogel, Inc., which is operating a single Mack model B773LST on this run, commented significantly, when asked by DIESEL PROGRESS to explain his operation on the Thruway: "Under the present tests, we are using the tractor ten hours per day or 1820 miles per week and if permanent operation is approved, we intend to purchase a second tractor and step up the operation to 3600 miles per week or 21 hrs. operation per day. Our B-61 Mack diesels are averaging 6.5 miles per gal. of fuel and the test tractor has been averaging 4.1 miles per gal. hauling two loads each regular trip. Our labor contract provides for $.02 per mile in addition to the regular mile rate of 10.65 cents per mile plus hooking and unhooking of the trailer. As of the middle of May, it appears that a savings of approximately $.04½ per mile for each trailer load or $.09 on both trailers can be effected. Other savings in insurance and fuel will be offset by some local labor cost such as pickup and delivery of the

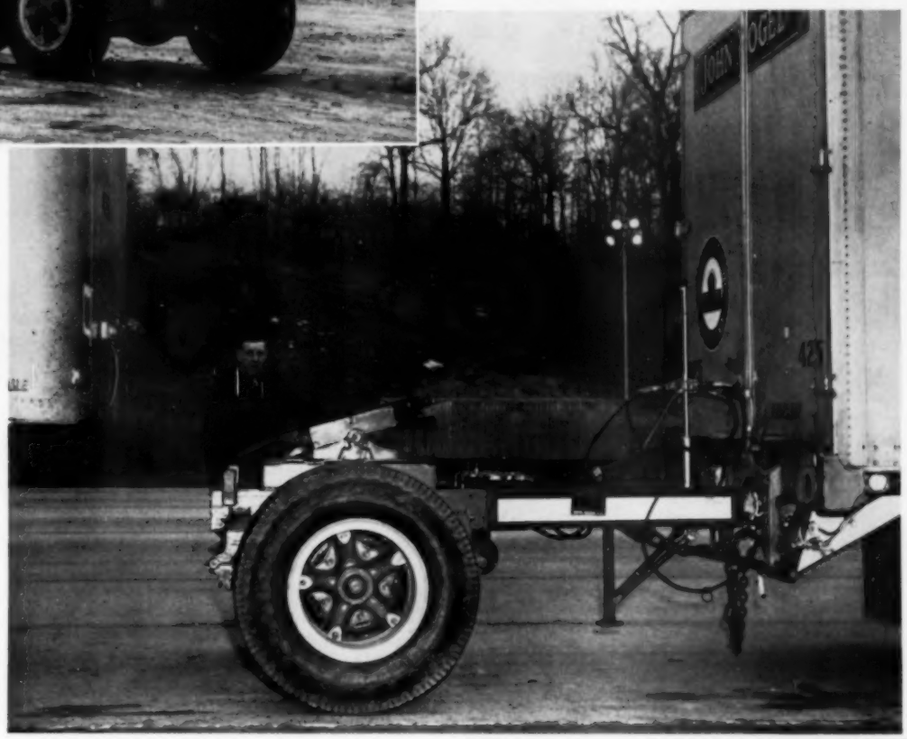
The "dolly" is handled with dispatch by two men. Tires are Goodyear 10:00 x 20, 12 ply with extra tread nylon.

second trailer must not exceed 58,400 lbs. The total tandem-trailer unit is required to perform at a speed not less than 20 mph on a 3 per cent grade. The double-bottoms currently travel 539 miles on the New York Thruway with the western point of entry at Ripley (see map) and eastern terminal points at New York City and Albany. The remainder of the 559 mile network now under construction is scheduled for completion before late 1960. Units moving to Boston over the Massachusetts Turnpike must be broken up at the Albany interchange and at the Route 9 interchange on the Berkshire Section and travel between these two points as regular units via Routes 9 and 20 until the Berkshire Link bridge over the Hudson River is completed next spring. When "double bottoms" reach the ends of their runs, the trailers are converted to two conventional units for hauling to specific destinations.

Since the tandem combinations may not be used on regular highways, the Thruway Authority in cooperation with the Massachusetts Authority, has made available temporary areas at various terminal points for the hook-up and break-up of the vehicles. These are as follows:

	Milepost Location
Yonkers Toll Barrier	5.5
Suffern Interchange #15	30.4
Albany Interchange #23	141.9
Utica Interchange #31	232.9
Syracuse Interchange #36	282.9
Buffalo Barrier #N-1 at Clinton Street on Niagara Section	N1.6
Ripley Interchange #61	494.9
Route 9 Interchange #B-1 on Berkshire Section (for Boston runs)	B6.58

At last report Denver-Chicago was operating between Suffern and Buffalo; Spector Mid-States between Ripley and Albany and on the Berkshire Section to Boston; Western Express between Ripley and Albany; John Vogel between Albany and Yonkers Barrier; C & E Trucking between Canjoharie and Yonkers Barrier and Red Star between Syracuse and Suffern. All of the test vehicles are being carefully observed by state engineers, manufacturers and toll road authorities to determine how the larger vehicles handle in traffic, how they perform under various weather conditions and how motorists react to them.



Special set of tandem axles or dolly developed by Fruehauf Trailer Co. for the turnpike tests.

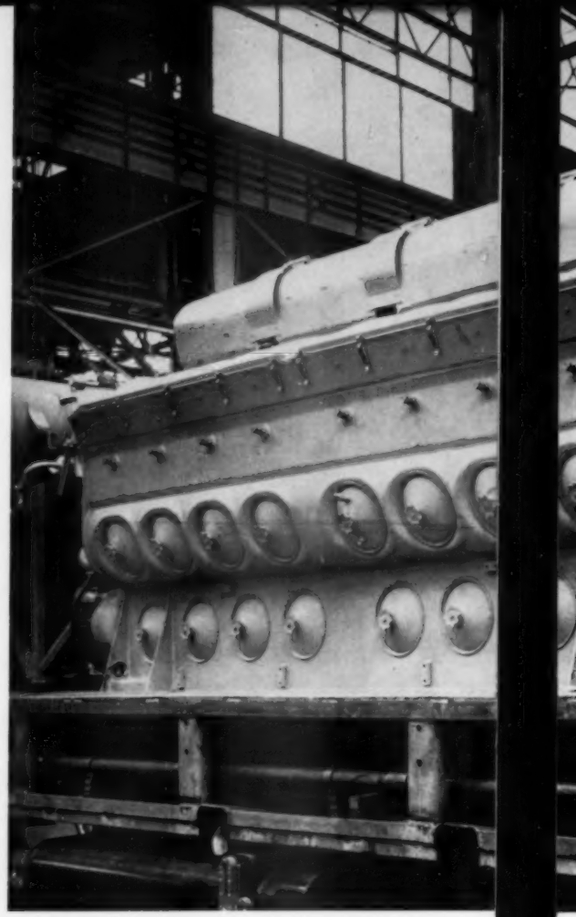
Close-up of the Mack tractor-trailer unit operated by Vogel. Unit has special brake and electrical semi-trailer connections including breakaway valve.

trailer unit to the Thruway pickup areas. We have operated this unit 24,180 miles on this test and it is performing beyond our expectations. We have encountered no adverse public opinion. The units track excellent; no problem in passing other tractors and trailers; safety results are excellent and so is driver appeal.

Regulations for the tests were issued by the New York State Thruway Authority in early February and these subsequently were followed by the Massachusetts Turnpike Authority. Basically these test regulations state that the tandem-trailer units must consist of two semi-trailers each with a length not in excess of 40 ft. and hauled by a single tractor. Any such combination of vehicles may not exceed a total length of 98 ft., or a maximum gross weight of 127,400 lbs. The permissible number of axles shall be a minimum of six and a maximum of nine. The maximum gross weight of the combination of the tractor and first semi-trailer may not exceed 69,000 lbs. and the maximum gross weight for the combination of the dolly and the

EMD TURBOCHARGES "567" INTRODUCES LOCOMOTIVES

By BRUCE W. WADMAN



ELECTRO-MOTIVE Division of General Motors has unveiled three new and more powerful models of the well known 567 engine, which have been incorporated into two new series of locomotives. These new engines will also be available for industrial and marine applications. Of primary importance in these engines is the application of turbocharging to achieve higher output and substantially improved fuel economy. The turbocharging system designed into the 567 engine has many features and from a firsthand view the following stand out: (1.) Improved fuel economy up to 10 per cent better than previous naturally aspirated models. (2.) Compact turbocharger-engine package, utilizing planetary gear drive from engine at start and low loads to provide good scavenging. Overrunning clutch allows turbocharger to run free as load increases, permitting engine to operate with self sustained turbocharger at higher loads. (3.) Increased horsepower output from 1750 tractive hp for old model to 2400 tractive hp for turbocharged and intercooled engine. (4.) Well engineered and matched system beginning with the turbocharger, designed and built by Electro-Motive, and extending all the way through the engine. Modifications have been made where necessary to incorporate many important improvements in structural and wearing parts to accommodate higher horsepower output and give long life.

The turbocharged engine is available in two horsepower sizes, 2000 and 2400 tractive hp. The naturally aspirated version has been raised from 1750 to 1800 tractive hp primarily by increasing the compression ratio to 20:1, which also results in a 5 per cent improvement in specific fuel consumption at full load. All of these engines are the 16 cylinder 567 series. The naturally aspirated engine also features all the heavy duty structural and wearing part improvements incorporated in the turbocharged engines. The engines will be used as follows in the new locomotives announced:

1. Naturally aspirated 20:1 compression ratio 567D1 engine, rated 1800 tractive hp for application in the General Purpose four motor GP18 and Special Duty six motor SD18 locomotives.

2. Turbocharged 567D2 engine with 2000 tractive hp for application in the four motor, General Purpose GP20 locomotive.

3. Turbocharged 567D3 engine with 2400 tractive hp for application in the six-motor, Special Duty SD24 locomotive. (This locomotive was announced earlier this year and described in the February issue of DIESEL PROGRESS.)

Three main areas stand out in the new engine design and merit detailed descriptions. They are the turbocharger and its installation, new fuel injectors, and structural changes in the engine with accompanying improvements of engine accessories.

Turbocharger

A single air-cooled turbocharger is used, operating as a constant pressure system on the axial flow principle. Exhaust gas from the cylinders is gathered in a common manifold that runs the length of the engine and is set in the vee. This manifold enters the turbine inlet through a split turbine housing. Exhaust gases are guided through inlet vanes onto the single stage axial flow turbine. The rotating assembly consists of a centrifugal aluminum impeller and the single stage, axial flow turbine wheel. At high power, the exhaust gases provide all of the energy to drive the rotating assembly by expanding the gas through the turbine. At lower engine speeds, where the energy in the exhaust gases is not sufficient to provide adequate air to the engine cylinders, the rotating assembly is driven by a planetary gear train operated from the rear gear train of the engine. The gear drive insures that there is adequate air for engine starting, for low loads, and for engine acceleration. When the exhaust gas energy is sufficient to drive the turbine wheel faster than the engine gear drive, an over-running clutch in the planetary gear system allows the rotating assembly to become free running. This arrangement not only provides a compact design, but allows the engine to operate most efficiently over the entire range of engine load conditions. The turbocharger goes on self-sustained operation at approximately the seventh throttle position.

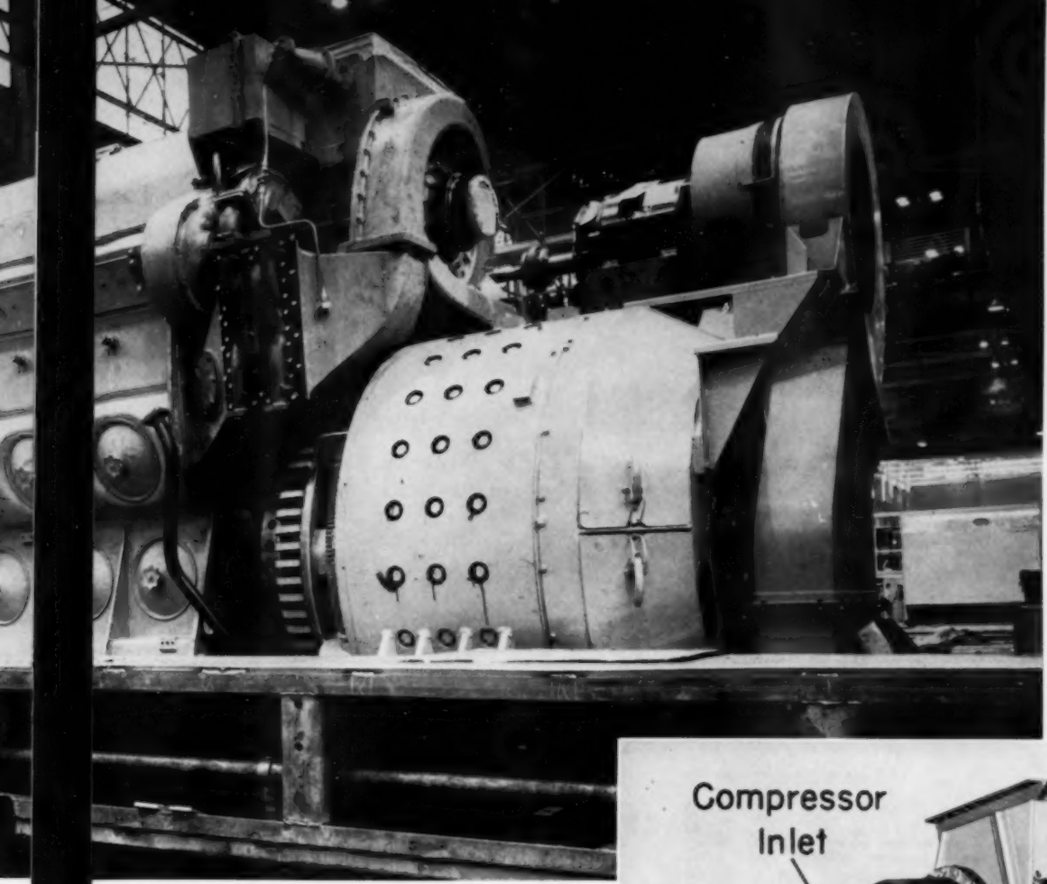
Harrison intercoolers are used, one for each bank of cylinders in the 2400 hp engine and are placed in the air discharge elbow between the compressor and engine air box. Important performance features of the turbocharger are as follows: operating speed—17,000 rpm; pressure ratio approximately 2:1; bmep rating on the 2000 hp 567D2 engine is 114 lb/sq in. and on the 2400 hp 567D3 engine the bmep rating is 136 lb/sq in.

New Needle Valve Injector

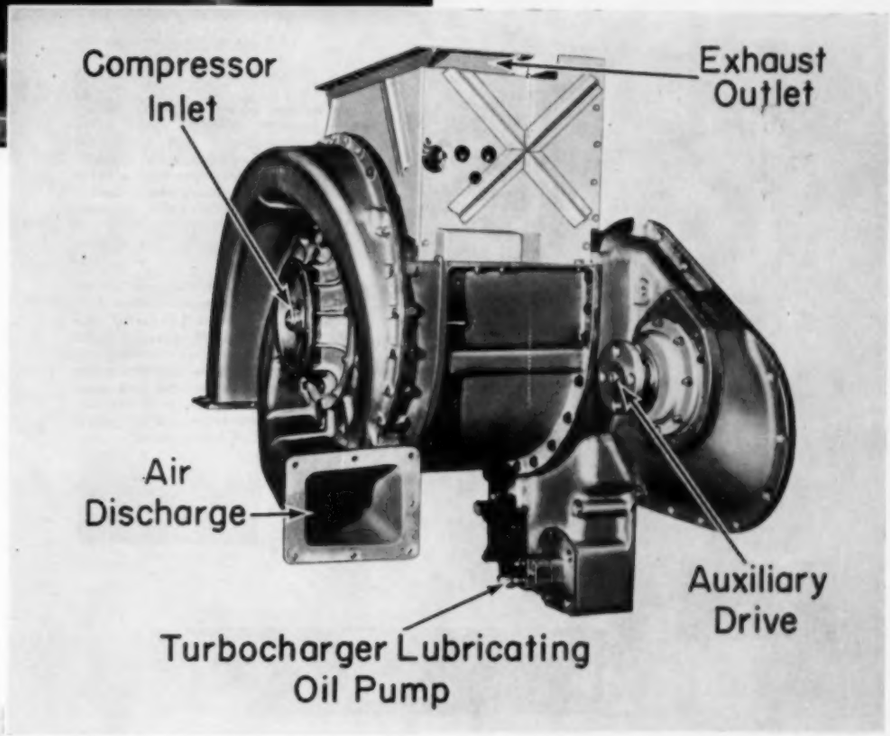
A new type needle valve injector that improves fuel injection efficiency has also been announced coincident with these new engines, and will be applicable to old locomotive diesels as well as the new models. This new injector promises important potential fuel economy to railroads and is well adapted to handling heavier economy grades of fuel. Incorporating a differential needle valve arrangement the new injector has two important advantages over EMD's spherical valve type: One, valve opening pressure has been increased from 1200 psi to approximately 3000 psi which improves initial atomization of the fuel. Two, the valve seat has been located extremely close to the spray tip, and in combination with the high valve closing pressure insures positive cut-off of fuel at the end of injection, contributing importantly to improved specific fuel consumption of the engine. According to Electro-Motive engineers, with the higher combustion efficiency, there is less carbon deposit and the higher thermal efficiency results in more useful power. The degree to which fuel consumption is improved is variable with engine rpm and with load. The spray tip contour in the needle valve injector also has been modified to provide lower operating tip temperature. A slightly longer orifice provides better atomization and spray pattern, but the spray tip orifice size and number are the same as those in the standard spherical valve injector. All spherical valve injectors in use on General Motors locomotives in railroad service today can be converted to the new needle valve type. Such conversion requires re-calibration of the injectors (the degree of control of fuel output) and for this Electro-Motive has developed a special test stand.

Engine and Accessory Improvements

Turbocharging of the engine dictated several modifications in the 567 series engine to accommodate the turbocharger. These modifications are in the exhaust system, the cooling and filtering systems, certain structural members, and in such important parts as camshafts, pistons, piston pins and piston pin carriers, cylinder liners, cylinder heads, injectors, etc., all of which are applicable to the complete engine line. These modifications, necessary for the high-output engine, bred many developments that effect major benefits to the 1800 hp, naturally aspirated engine. EMD engineers estimate normal scheduled maintenance can be reduced as much as 60 per cent with new engine



Turbocharged engine installation on SD24 locomotive under construction at main Electro-Motive plant in La-Grange, Ill. Note compact arrangement of turbocharger system on the engine.



View of turbocharger on new GM 567D diesel. Turbocharger, designed and built by Electro-Motive, supplies all the air to engine air intake. It operates off engine gear train at low loads and when exhaust gas energy is sufficient to drive turbine wheel faster than engine gear drive, overrunning clutch in system permits the rotating assembly of turbocharger to become free running.

One of the first 2400 hp turbocharged SD24 locomotives ready to go into service for the Burlington.

design features and other locomotive component improvements.

Changes in the new 567D engine as compared to the 567C engine include the following:

—The crankcase has been modified, with strengthening of certain structural members as required to withstand the higher mechanical and thermal loading when the engine is turbocharged.

—Main bearing cap changed to withstand higher mechanical loading.

—Silver-backed connecting rod bearing.

—Piston pin and piston pin carrier completely redesigned to carry higher mechanical loading, involving removable bearing insert.

—Piston modified to provide better cooling of the piston crown. The design change permits more rapid heat transfer to the cooling oil, thus reducing thermal stresses. In operation, the rim temperature of the new piston is 17 percent less than the former piston, while piston temperature in the ring area also is reduced.

—New higher strength ring combination with four narrower faced ($\frac{1}{16}$ in. width) compression rings, three of which are chromium plated. The bottom oil control ring is spring-loaded for reduced lube oil consumption.

—Cylinder head modified to improve cooling.

—Injector rocker arm strengthened.

—Camshaft profile changed to improve exhaust valve action by reducing stresses on the exhaust valve, valves pring, valve keepers, other related parts. Smoother valve motion reduces seating stresses.

—Improved lower liner sealing arrangement incorporating a new solid type cylinder liner insert, and addition of a second lower liner air seal.

—New panel type oil bath filters provided as basic equipment.

—High capacity oil pumps to improve bearing and piston cooling.

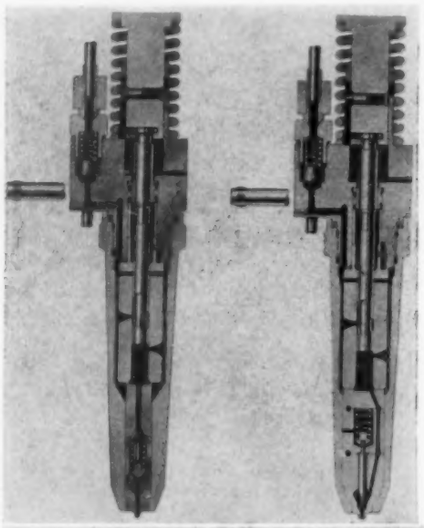
—High capacity lubricating oil filter system.

—New three-piece engine exhaust manifold clamp.
—New coil spring design accessory drive gear.
—Flexible couplings eliminating rubber hose connections.
—48 in. engine cooling fans replacing 36 in. fans.
—Improved engine fuel filter.

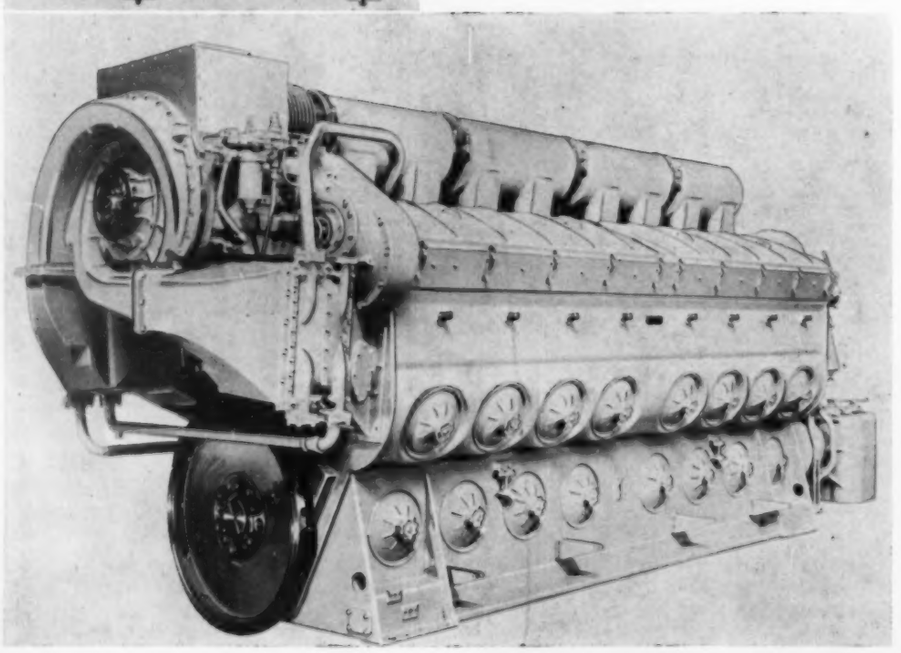
Additional changes required for the turbocharged version of the engine as compared with the naturally aspirated D engine include the following:
—Electro-Motive turbocharger in place of the Roots-type blowers.
—The exhaust manifolds modified to suit the demands imposed by turbo-charging of the engine.
—High capacity water pumps to provide more cooling water for the engine and the intercoolers.
—Modified governor to limit fuel input and prevent smoke during acceleration.

Because of the fewer traction motors (four) in the GP20 locomotive as compared with the six-motor SD24 locomotive, a lower horsepower rating of 2000 is used for the 567D2 engine applied to the GP20. Because of the reduced horsepower rating, the following modifications are made in the 2000 hp 567D2 engine as compared to the 2400 hp 567D3:
—Intercoolers are eliminated which permits use of standard water pumps instead of the increased capacity water pumps.
—Lower capacity injectors are utilized. However, these are the new needle valve injectors rather than the former spherical valve type.

It is helpful to more specifically describe some of the improvements to illustrate exactly how reductions in scheduled maintenance are achieved. For example, the new seven element lube oil filter will operate approximately twice as long as the previous four element filter. A new engine mounted fuel oil filter reduces maintenance hours since elements can be changed quickly and easily without tools. A new suction fuel oil strainer with a stainless steel fine mesh element effectively protects the fuel pump. The increased filtering capacity of the new element prevents filter plugging during cold weather operation. A new panel type oil bath engine air filter provides cleaner air than the previous panel types. EMD engineers report that filter cleaning periods may be extended to 3 months and cleaning is accomplished without removing the filter from the engine. The various filtering systems are just one part of the many maintenance reducing features in the new engines but serve well to illustrate operating costs reductions achieved.



Cross-section photos showing differences between spherical check valve fuel injector (left) and newly developed needle-valve injector (right). Needle-valve injector provides a valve opening pressure more than double that of the spherical valve injector.



General Motors turbocharged, 16-cylinder 567D diesel engine—prime mover for the new 2000 hp GP20 and 2400 hp SD24 high speed freight locomotives announced recently by Electro-Motive. Engine contains many improvements in structural and wearing parts made applicable to the naturally aspirated engines that power other GM locomotives.

The New Locomotives

The two new series locomotives incorporating the engines described above will offer substantial savings for the railroads in maintenance and operating costs and give new impetus to the programs of these roads to haul high tonnage at higher speeds. Besides the locomotives mentioned previously powered with various models of the new engines, another unit, the RS1325 road switcher powered by a 12 cylinder 567D1 engine, has been announced. This locomotive has a 1325 tractive hp engine and has a silhouette longer but similar to the GM SW1200 switching locomotive with a short hood behind the cab to accommodate a steam generator for train heating. One of the most important characteristics of the two new turbocharged models, the GP20 and SD24, besides the higher capacity and higher speed is an engine that does not derate over a wide range of altitudes. Tests have shown that up to at least 8000 ft. the 567 turbocharged engine maintains virtually its full output. The free-running turbocharger provides the ability to compensate for changes in air density with increases in altitude. As the altitude increases, the turbo-charger speed increases, insuring that the amount of air required to burn the fuel is available. Primary applications for the GP20 and SD24 locomotives will be on those railroads that desire to operate present trains on faster schedules or haul the same tonnages on present schedules with fewer locomotive units.

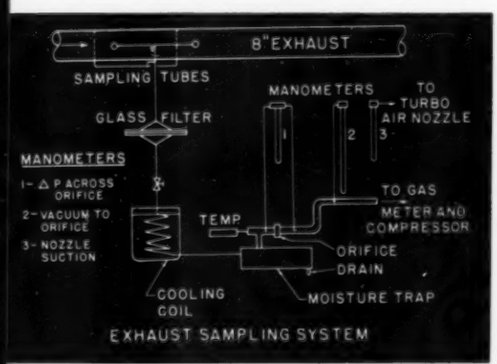
Mr. N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive, in commenting on engine and locomotive developments, made important reference to upgrading possibilities also as follows: "The improvements offer enormous opportunities for savings because we have designed them not only to go into these new production models, but also so they can be incorporated in most of the General Motors road locomotives now in service. The thousands of the older road locomotives that will reach the point of consideration for major overhaul or retirement in this and the next few years all can be upgraded to the equivalent of our new models with these improvements." These new engine developments particularly are among the most important announced in recent years for railroads because of the very significant operating economies they offer. Tremendous sums are spent each year by the railroads on fuel, maintenance and other operating costs. By taking advantage of the economies offered by modern equipment such as we have described here, railroads can achieve substantial improvements in day-to-day operating profits; also, from the performance standpoint in being able to offer more competitive schedules in freight movements. Railroads today can not afford to do anything but obtain the most efficient operation from their diesel locomotives. Competitive conditions from other forms of transportation and the serious squeeze on profits even in times when carloadings are good should make the railroads welcome important cost cutting developments like these with open arms.

Radioactive Isotopes at work studying what goes on inside a large engine at Cooper-Bessemer Corporation, Mount Vernon, Ohio.

SIGNIFICANT DATA FROM RADIOACTIVE RESEARCH

WHAT happens inside a new diesel during the first hundred hour break-in period? Is there early-high piston ring wear? Does speed affect oil consumption? Does temperature increase or decrease oil consumption? These questions concern every diesel user who earnestly seeks the ultimate in engine performance life and economy. The same questions are also of prime concern to engine builders in their constant search to find ways to reduce factors effecting economy, such as lube oil consumption or other factors influencing life of piston rings and cylinder liners.

New techniques in using radioactive isotopes for studying engine wear are being found to be one of the most advanced and effective methods for researching what goes on inside the modern, high output diesel engine. And determining it the moment it happens. In the standard Cooper-Bessemer 100 hr. oil consumption and ring wear testing, under previous test methods, oil consumption normally could be determined only by measuring the amount of lubricant added to bring a crankcase level to its initial height. Since oil consumption in any one short period could not be detected, it was difficult in the past to determine, during a 100 hr. run for example, if excessive oil consumption was occurring at any one particular period. The same held true for piston ring wear or other wear variables occurring during some part of the test run period.

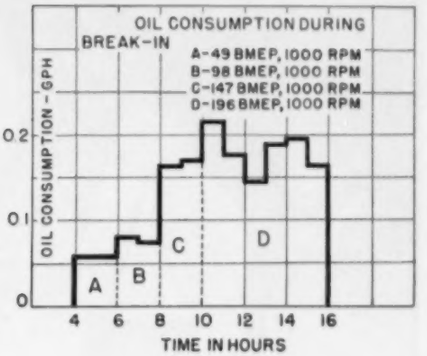


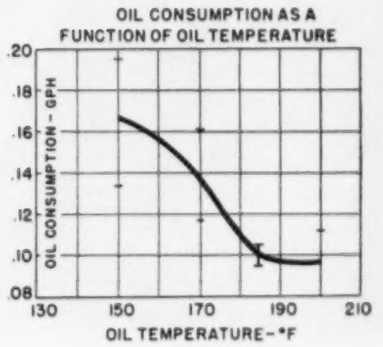
EXHAUST SAMPLING SYSTEM

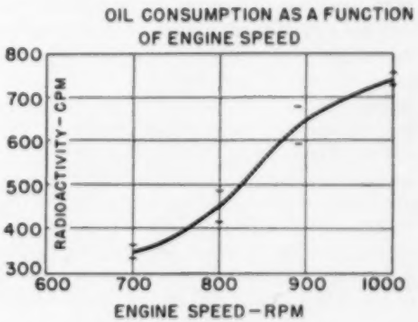
To find answers that would effectively help evaluate engine wear and oil consumption, particularly during the break-in period, Cooper-Bessemer research engineers in conjunction with Battelle Memorial Institute have developed a radioactive tracer method of engine research. The method has proved to provide the necessary sensitivity in that it successfully measures the rate of oil consumption as a function of time and engine operating conditions. Briefly, results of the initial tests show that:

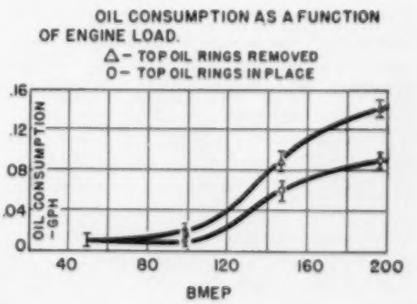
1. The rate of lube oil consumption does not change during the first 100 hr. run-in period.
2. If early high piston ring wear does exist, it has no apparent relation to oil consumption.
3. As engine speed and load increase, oil consumption increases.
4. Increasing of oil temperature and water jacket temperature decreases oil consumption.
5. The existence of the top oil ring on a piston has a marked effect on maintaining low lube oil consumption.

The use of the radioisotope tracers is based on the effect that a radioactive tracer is carried into the exhaust stream from lube oil burned in the cylinder. As a result, simply sampling the exhaust stream indicates instantly what is occurring within the engine. Chart I shows the engine test procedure used at Cooper-Bessemer research department for this initial work. Shown in the charts is detailed test data showing the effect of engine variables on lube oil consumption.

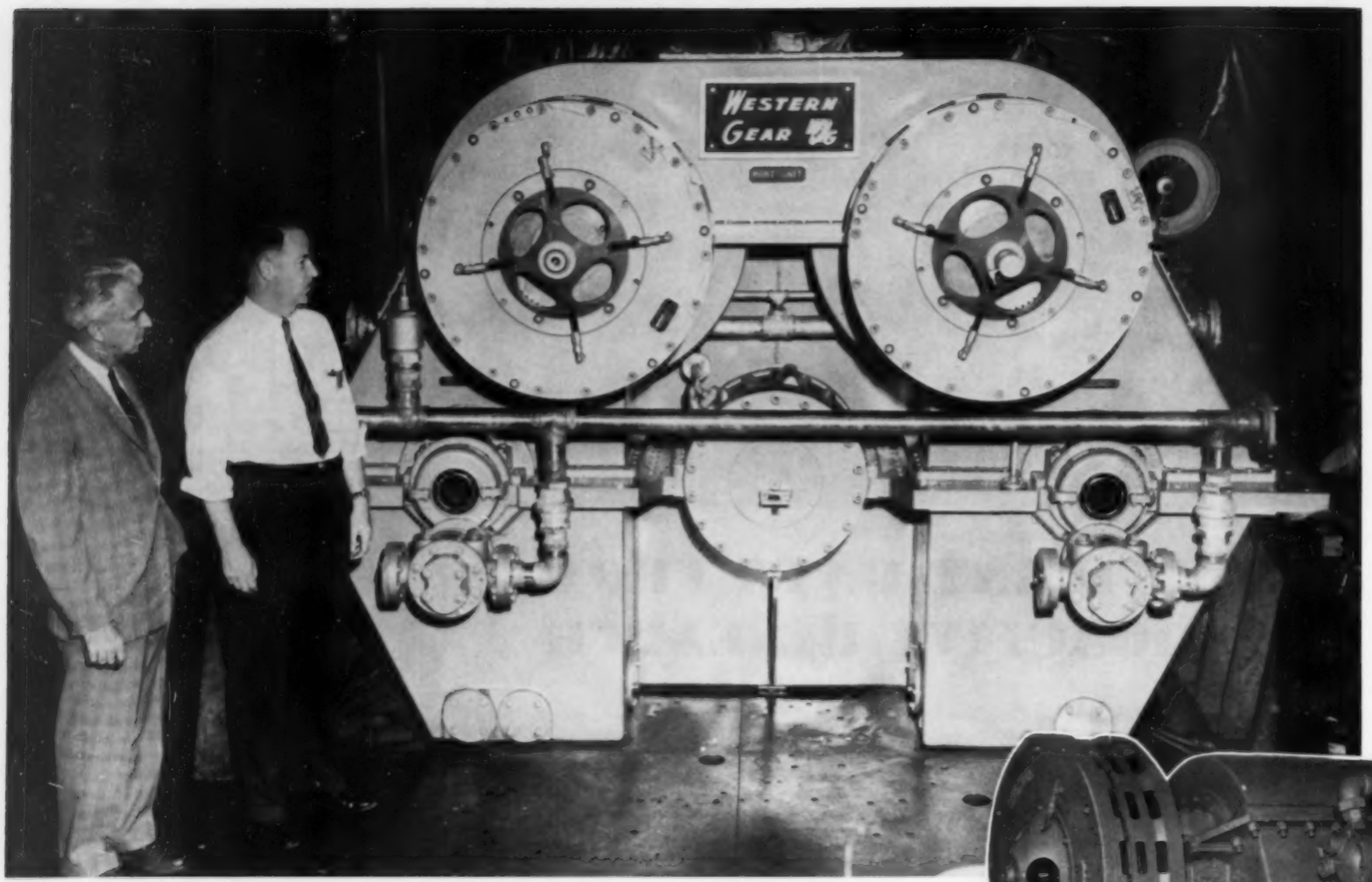


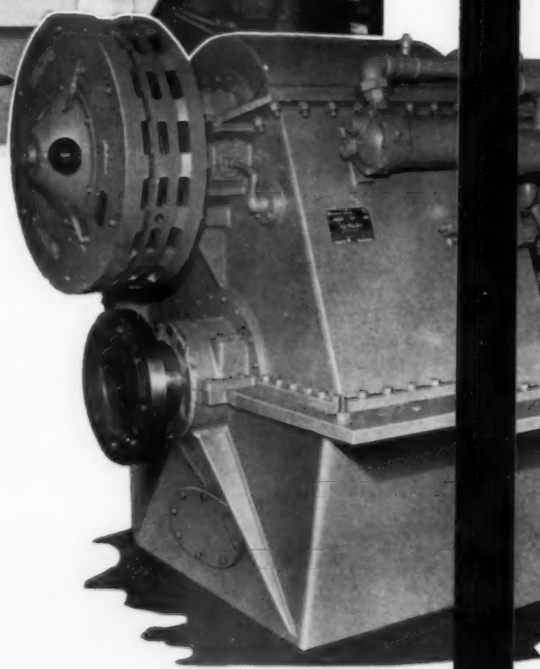






PNEUMATIC REVERSE-REDUCTION GEAR FOR HIGHER HORSEPOWER MARINE DIESELS





Twin engine version of PCMR Sea-Master reduction gear, available for 2, 3 or 4 engine application. Illustrated model has 2 input gear sets driving a common bull gear. Each engine 1500 hp, shp is 3000.

Shown here is PCMR Sea-Master reduction gear as supplied to Curtis Bay Towing Co. tugs *Carolyn* and *Jefferson*. Externally mounted Wichita clutch shown top left.

RECENT trends to increased horsepower and speed in marine diesel propulsion engines for more profitable operation is the key to Western Gear Corporation's development of a new pneumatic reverse and reduction gear. In announcing the gear, Western officials point to five years of research and development work which included discussions with important members of the marine trade, naval architects, shipbuilders, users and engine builders. The gear, identified as the PCMR Sea-Master, incorporates several new concepts in marine equipment including utilization of a pneumatic clutch. The gear is now being produced in a line to meet any diesel propulsion requirement from approximately 800 to 20,000 hp.

Recognizing that dependability and ease of maintenance are almost synonomous, Western Gear has conservatively designed and rated the unit and feels that it offers maintenance features which are of particular appeal to owners and operators. One of the most significant developments is the clutch location and arrangement. The clutches, built and supplied by Wichita Clutch Co., are located on the outside of the gear and independently and completely supported by the gear unit itself. They are located on the forward and aft ends of the gear unit and not between the engine and the gear as is the usual case for this type of equipment. Features of this arrangement are as follows: all wearing parts of the clutches may be inspected or replaced in a minimum of time since the connection between the engine and the gear is not disturbed for this purpose; air flow to the clutches has minimum restriction and as a result free air flow for adequate cooling under controlled slip or severe reversing operations is assured; positive alignment between driven and driving elements of the clutches is maintained due to the close support on bearings of these two elements on the gear unit itself, and misalignment between the engine and the gear is not a factor in satisfactory clutch operation; individual roto-seal elements for introduction of air into the clutches coupled with a positive interlock control valve insures complete separation of air pressure in the two clutches. No leakage is possible between roto-seal elements.

Installation cost was another target in Western Gear's program. This has been accomplished in several ways. First, the use of either the quill shaft or solid shaft drive with conventional coupling simplifies the engine connection since special pillow blocks, stub shafts, and other similar equipment are not required to support the clutches.

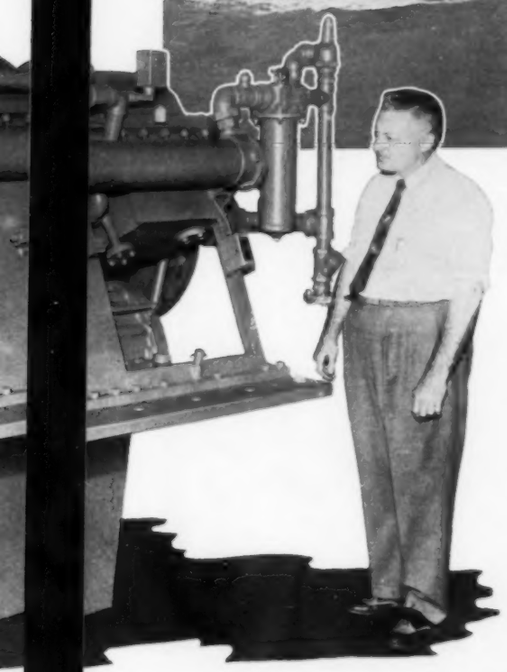
Second, the gear unit is supported on an extension of the lower housing split line flange which supplies adequate support in the area where it is required, i.e. in the center of the location of propeller shaft thrust, and special machined mounting brackets, base rails, etc. are not required. Third, positive gear housing alignment is achieved through use of a three-point mounting and installation system. This consists of three jack screws to provide three-point suspension which allows the housing they support during alignment stages to be completely independent of the shape of the sub-structure of the vessel. Gear case deflection is accurately measured on this three-point system within Western Gear's shop so that supporting chocks can be accurately machined to reproduce correct gear alignment. Fourth, with this construction the gear unit can be completely disassembled in the ship without disturbing basic alignment.

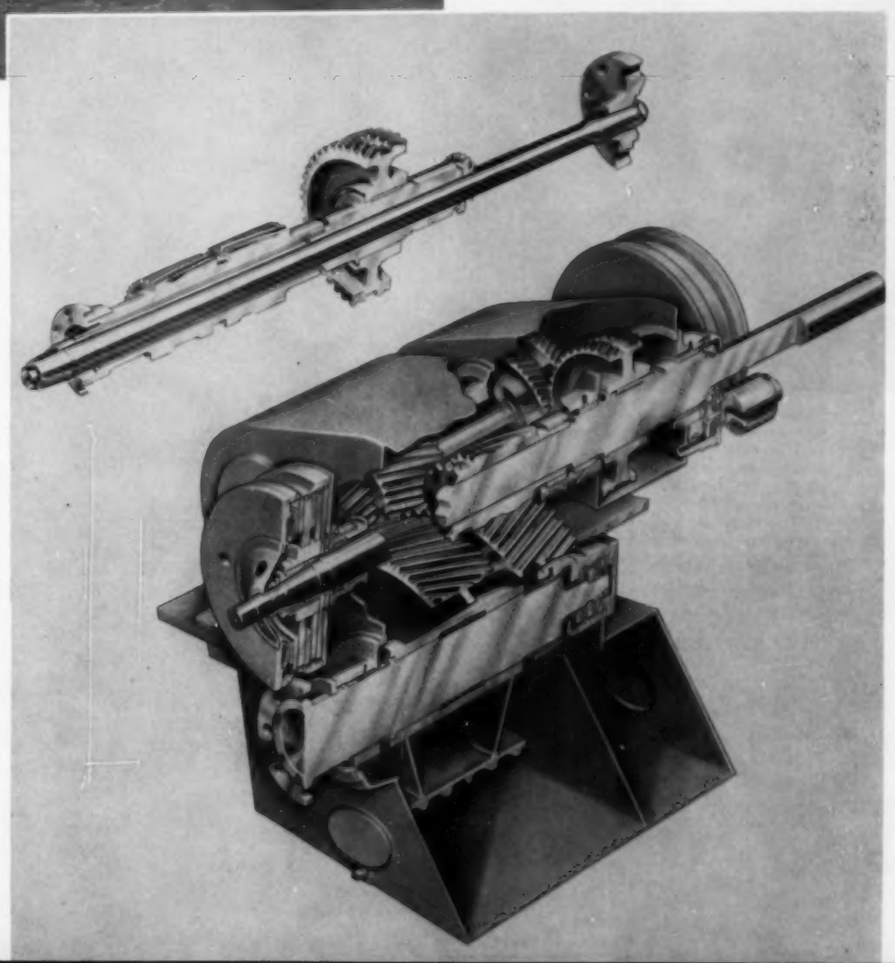
Considerable attention was given to the selection of the type of bearings utilized in the PCMR unit. After discussions with many influential people in the marine field it was decided to use split sleeve-type bearings. These bearings are arranged within the unit so that every bearing is accessible for individual inspection and maintenance by the removal of a few bolts and a bearing cap. No further disassembly of the unit is required for bearing inspection or replacement. A choice of thrust bearings is available with the unit because it is designed so that either the standard anti-friction thrust or optional multiple shoe babbitt face type bearing may be ordered.

The units are equipped with a complete self-contained lubrication system including oil sump, oil pump, cooler, filter, and piping. PCMR housing are constructed of fabricated steel, liberally ribbed and gusseted to maintain gear alignment, and arranged for maximum accessibility for inspection and maintenance. Gearing is precision generated by the continuous hobbing process and is the double helical type. Pinions are solid alloy steel forgings while the bull gear is a fabricated structure utilizing a continuous rolled alloy steel ring for the tooth sections. All gearing is heat treated for strength, toughness, and durability.

Another valuable feature of the Sea-Master PCMR provides slightly different ratios in astern than in ahead when desired. This allows the astern ratio to be tailored to the different characteristics prevailing at the propellor under this type of operation. The new gear is available in standard vertical, horizontal offset arrangements, in-line types, and also in multiple pinion designs to allow up to four engines on one gear unit. The first installation of the PCMR gear incorporating the Wichita pneumatic clutch was made on the Curtis Bay Towing Co. tug, *Carolyn*, described on pages 30 and 31 of this issue. The installation on the *Carolyn* is being followed by one on Curtis Bay's tug, *Jefferson*.

Curtis Bay Towing company's tugboat *Carolyn*, recently converted from steam to diesel, boasts 1600 hp. Here the 95 ft. boat is underway in Baltimore Harbor, enroute to a docking assignment. Power for the boat is supplied by a 12-cylinder Alco model 251 diesel engine driving through a Western Sea-Master PCMR 4:1 reverse-reduction gear.





Cutaway view of Sea-Master PCMR reduction gear and clutch. Illustrated at top is the quill shaft construction.

TUGBOAT *CAROLYN* . . . A MIGHTY MITE

Curtis Bay Tug, Converted to Alco-Western Gear Propulsion, Handles the Big Ones in Baltimore

IN the latest application of high-power diesel movers to its fleet of tugboats, the Curtis Bay Towing Co. has placed the *Carolyn* in service in Baltimore Harbor, but with a significant new capability: in the conversion from steam—begun last October and finished in January—the boat gained 1000 hp. Now, from her pier on Pratt Street in Baltimore, the 95 ft. tug—with 267 per cent greater horsepower than she had late in 1958—ranges the harbor, handling tows, dockings, and on occasion moving into the Chesapeake Bay to break ice.

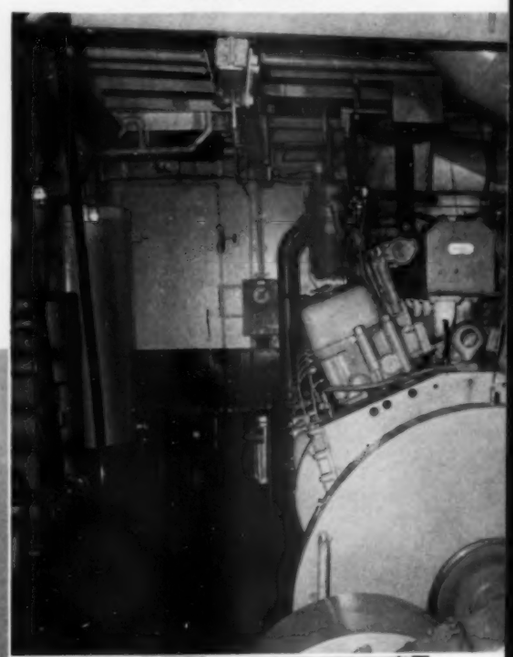
When the *Carolyn* moved to Curtis Bay's yard at Norfolk last fall, she was powered by a Scotch boiler with a Skinner uniflow reciprocating steam engine. The system turned out 600 hp—sufficient at one time but no longer powerful enough to handle the larger ships plying the ocean routes leading to Baltimore. The conversion and refurbishing of the *Carolyn*, completed at Norfolk in January, gives the boat 1600 hp for continuous duty. Replacing the steam engine is Alco Products, Inc.'s 12-cylinder model 251 diesel engine, driving a 102 in. bronze propeller through a newly developed Western Gear Seamaster PCMR reverse and reduction gear. For Curtis Bay, this was the fifth application of Alco turbocharged diesel power for tugboat duty. Still another conversion underway at Norfolk under the direction of CBTC's president, Captain H. C. Jefferson, is a sister tug of the *Carolyn*. Due for completion shortly this boat will carry the name *H. C. Jefferson* into service at Baltimore and again, Alco diesel-Western Gear will turn the screw.

The *Carolyn* was built in 1937 by the Pusey Jones Corp. at Wilmington, with an ice-breaking bow of three-quarter-inch welded plate. This bow was later reinforced by the Maryland State Port Authority, which uses the boat to break ice in Baltimore Harbor and upper Chesapeake Bay. According to Curtis Bay, the *Carolyn* and *H. C. Jefferson* will see the bulk of their service towing Western Maryland Railway car floats between Port Covington and the Bethlehem Steel plant at Sparrows Point. In that service, the company figures one tug can pull two 327 ft. car floats with each carrying 26 rail cars fully loaded with stone, ore, or finished steel. In the past, Curtis Bay has used a single 700 hp tug to move one float.

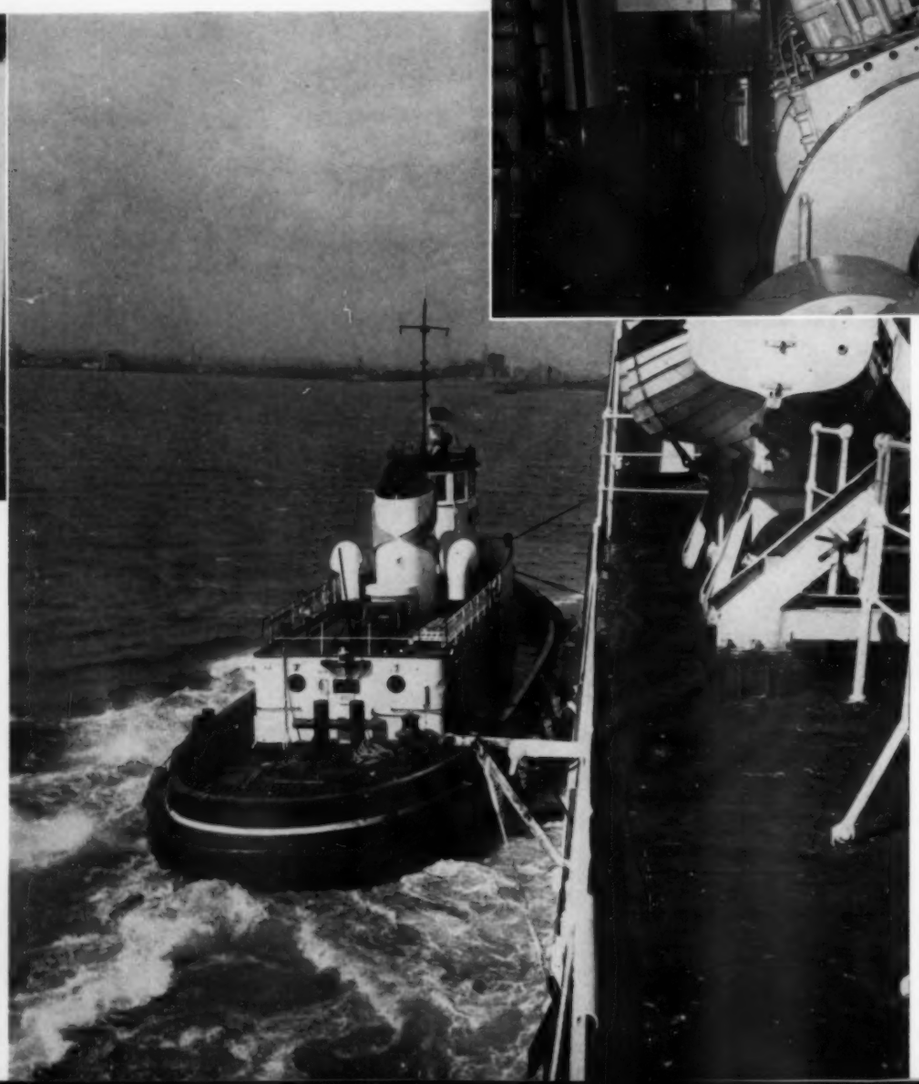
On a recent work day, James I. Pledger, retired Coast Guard commissioned warrant officer and skipper of the *Carolyn*, transferred from the tug to the British merchantman *S. S. Castledore* in the outer harbor, near historic Fort Carroll. The *Castledore* was in from Santos, Brazil with 10,300 tons of raw sugar. With Captain Pledger as pilot, the *Carolyn* moved his charge up the harbor to a point off the American Sugar Refinery, where the tug and the ship executed a tight 180-degree-plus turn in the narrow channel.

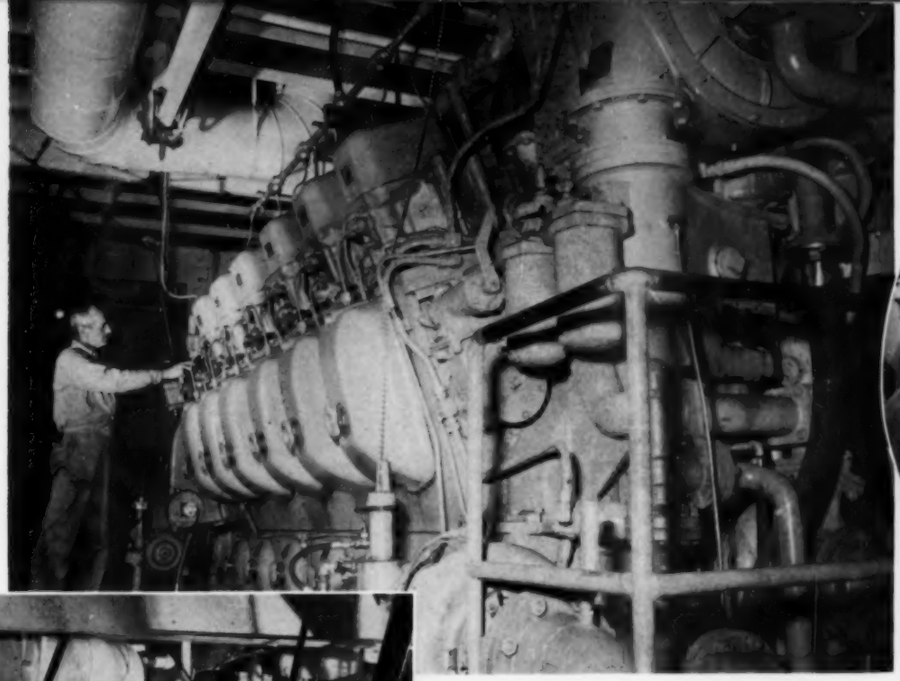
Carolyn's trial run was conducted by Coast Engineering Co. of Norfolk, over a 1⅛ mile course in the Elizabeth River at an engine speed of 1000 rpm and a shaft speed of 250 rpm. She averaged

Chief Engineer John T. Ward in the engine room of the *Carolyn*. To right is GM 3-71 diesel driving Delco generator for ships' service.

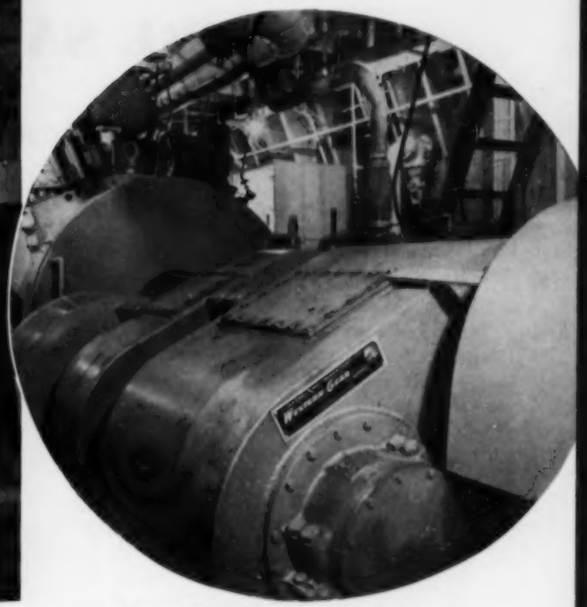


Capt. James Pledger at the helm of the *Carolyn*. Note radarscope (center) and modernized engineroom telegraph. The skipper's right hand rests on the lever controlling the air steering system.

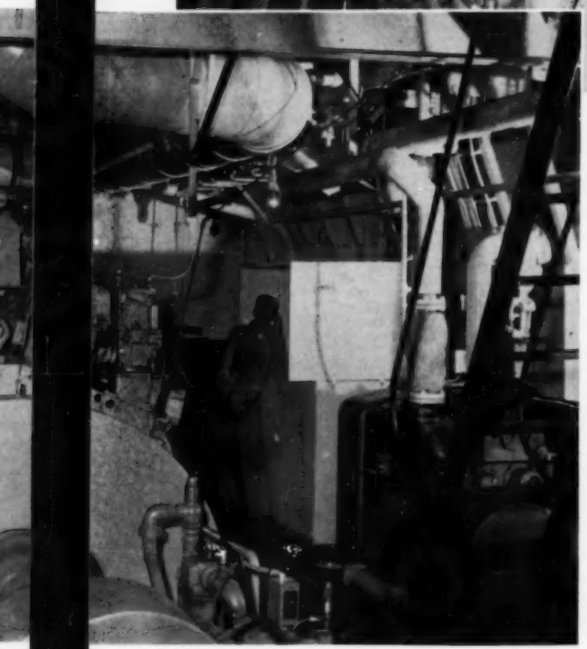




Chief Engineer Ward adjusts Woodward governor on the 1600 hp Alco diesel. Top right is turbocharger.



Through the combination of the Alco 251 diesel (background), and the Western Seamaster PCMR reverse-reduction gear, and its Wichita air clutch, the *Carolyn* has ample ability to handle a variety of assignments.



Bound for port with two starboard forward lines off to the *SS Castledore*, the *Carolyn* "walks away" with the British merchantman from the ship's quarantine anchorage, near Fort Carroll in Baltimore Harbor.

13.115 knots, and her finished stability test showed a metacentric height of 4.09 ft. The trial-run report shows these list charactertistics when the helm was put "hard over":

Engine rpm	List
600	0°
800	1.5° plus or minus
1000	3° plus or minus

In a crash reverse demonstration from full ahead, the tailshaft stopped six seconds after initiation and was turning at full astern 14 seconds after initiation. The *Carolyn* became dead in the water in approximately 30 seconds and "rapidly proceeded in the reverse direction." The molded hull of the *Carolyn* has a beam of 24 ft. and a beam over fenders of 25 ft., 5¼ ins. Her maximum depth is 14 ft., 9 ins. and her after draft measures an even 12 ft. A feature of the conversion work was the modernization of the wheelhouse, where Curtis Bay installed radar, VHF telephone and ship-to-shore AM telephone. Gone is the ship's wheel, replaced by an air steering system controlled by either of two levers in the wheelhouse. The tug carries a crew of five, including the skipper, engineer John Ward, first mate Samuel Crouch and two deck hands. She has a fuel capacity of 10,000 gals. and stores 3,000 gals. of fresh water.

Alco supplied the 12-cylinder 251 turbocharged diesel aboard the *Carolyn* and it has a maximum of 1800 hp at flank speed. The engine is a four-cycle unit with a 9 in. bore and 10½-in. stroke, and it weighs approximately 33,000 lbs. dry. The pneumatic Western reverse-reduction gear—first of a new model—has a 4 to 1 ratio with a dry weight of 17,300 lbs. It steps down the 1,000 rpm of the Alco engine to 250 rpm propeller speed. Previous applications of Alco power to CBTC tugs utilized hydraulically operated reduction gearing. The PC-MR unit—certified by the American Bureau of Shipping—is equipped with Wichita air clutch, sleeve-type journal bearings with removable caps, quill shaft drive, multiple shoe-type thrust bearings and oversize coolers. Maintenance is eased by placing the ahead and astern clutch on opposite sides—a feature that also provides better cooling than when both clutches are in the same housing. The reverse-reduction gearing's lube oil system is self-contained, and it has fabricated steel housings and heat treated alloy steel double-helical gears.

List of Principal Equipment

Main engine	Alco
Jacket water cooler	Young
Reverse reduction gear	Western
Thrust bearing	Kingsbury
Switch gear	Westinghouse
Governor	Woodward
Auxiliary diesels (2)	General Motors
Auxiliary generators	Delco
Air clutch	Wichita
Lube pump	Allis Chalmers
Lube oil filter	Commercial (Michiana)
Air compressors (2)	Quincy
Muffler	Maxim

Capt. Pledger of the *Carolyn* boards *SS Castledore*, ready to pilot the ship to her berth at the American Sugar Co. pier. From this point on the *Carolyn* was under the helm of First Mate John Crouch.

WE'RE SAFE HERE*

By HUGH ROSE

UNNOTICED, a man with a rifle walks across a field towards a high tension line tower. Carefully, deliberately he sights his high powered rifle. An instant later the transmission line goes up in smoke; the city is plunged into a blackout! Absurd? Yes. Impossible? No! It actually happened in the City of Miami, Fla. not long ago. A 75 mile strip of Miami's famed Gold Coast was blacked out. Three major causeway drawbridges were open when power "died." Miami knows only too well that such an occurrence is not impossible.

A cat slips through narrow bars into a transformer vault. A few minutes later this curious cat steps carefully on the wrong spot. An entire city is thrown into a disastrous blackout! Absurd? Impossible? Duluth, Minn. will say that it is very possible. Duluth and a portion of Superior, Wis. were paralyzed when this very thing occurred not long ago. An area of a quarter of a million people was affected. Animals are a very real hazard, and almost every utility company can recall a similar "absurd" incident.

A driver fails to make a sharp curve. His car runs off the road and crashes into a high tension line tower; a town is suddenly without power! Absurd? Not at all. It happened recently in Sayreville, N.J., and it has probably happened in your town for it is a very common hazard that plagues most light and power companies. There are myriad causes of power failures. Snow and sleet regularly snap high tension lines. Hurricanes with their high winds, lightning and floods along with many other Acts of God cause power outages. Faults—short circuits—are caused by defective electrical devices, trees falling on power lines, traffic accidents where power line poles are hit, animals, line breakage, and over-loading. Transformer explosions, brakedown in generating equipment, and other causes too numerable to mention here can mean disastrous outages.

It's quite a gamble for any hospital without a standby generator set on the premises to say, "We are safe here." Yet many hospital administrators do just that. In June of 1955, an administrator of a small New England hospital in a well "protected" area discussed this problem with the hospital board of directors. They had no emergency generator set. Unfortunately, the opinion was, "We are safe here. We have batteries and are fed by two separate utility substations." In August of 1955,

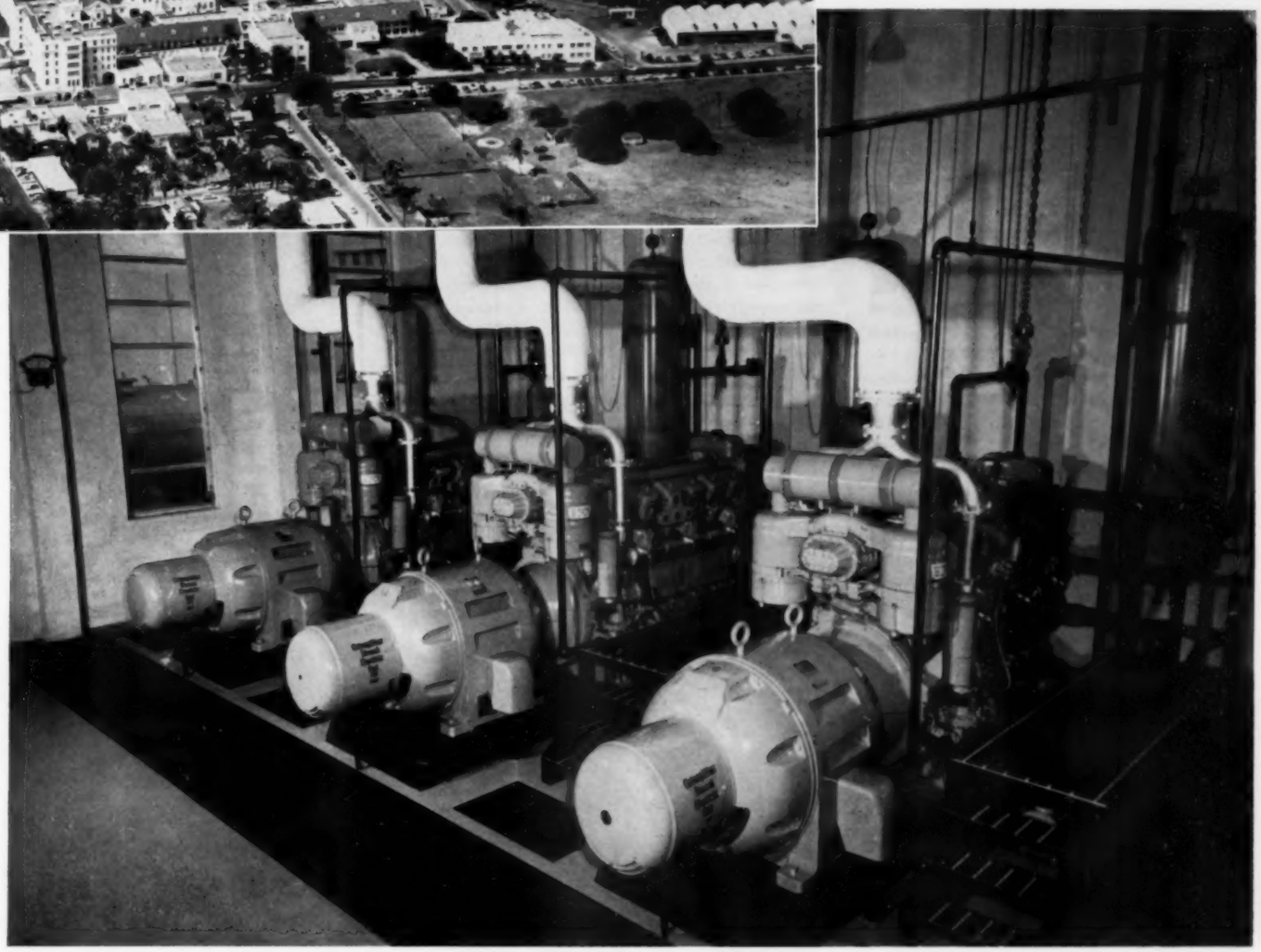
**This article is a review of Caterpillar Tractor Company's, "Guide Book for Emergency Power." Mr. Rose is Eastern field representative for Caterpillar's Engine Division.*

Hurricane Connie died in New England. In her death throes she dumped torrential rains on Connecticut, New York, New Jersey, Pennsylvania, and Massachusetts. Rivers rose at startling rates completely isolating wide areas, devastating whole towns. Utility services to the hospital were quickly disrupted. As power failed, the flood areas were paralyzed. Within a matter of hours, a major portion of Connecticut was declared a disaster area, as were wide areas of adjoining states. The bitter

COMPARISON OF OPTIONAL EQUIPMENT
FOR STANDBY DIESEL ELECTRIC SETS FOR HOSPITALS

EQUIPMENT	TYPE	PURCHASE AND INSTALLATION COST	OPERATING AND MAINTENANCE COSTS	DEPENDABILITY	SPACE REQUIRED	PORTABILITY	REMARKS
COOLING SYSTEM	Radiator - Engine mtd.	Medium	High	Excellent	Medium	Excellent	Engine driven fan; high HP requirement, noisy
	Radiator - Remote	Medium	Medium	Good	Medium	Fair	Electric fan, medium HP requirement, some noise
	Heat Exchanger	Low	Depends on water cost	Requires much water	Small	Poor	Requires dependable water supply
	Cooling Tower - Atmospheric Spray	Medium	Low	Requires some water	Large	Poor	Spray may be objectionable
	Cooling Tower - Mechanical Draft	High	Medium	Requires a little water	Large	Poor	Some noise
STARTING SYSTEM	Manual - Air	Medium	Low	Good	Large	Poor	Requires Attendant
	Manual - Electric	Low	Medium	Good	Medium	Good	Requires Attendant
	Manual - Gasoline	Low	Medium	Excellent	Small	Excellent	Fire hazard due to gasoline; requires attendant
	Automatic - Air	High	Low	Good	Large	Poor	Requires gravity feed fuel system
	Automatic - Electric	Medium	Medium	Good	Medium	Fair	Requires gravity feed fuel system
MOUNTING & FOUNDATION	Enclosed Packaged Unit	High	-	-	Small	Excellent	Restricted to smaller sizes
	Skid Base	Medium	-	-	Medium	Good	Switchgear, batteries, etc. mounted separately
	Concrete Foundation	Low	-	-	Large	Poor	Heatest, most easily serviced type
GENERATOR	Externally Regulated	High	Medium	Good	Large	Fair	Separately mounted voltage regulator and rheostat
	Self Regulated or Packaged	Low	Medium	Excellent	Small	Excellent	Self-contained voltage regulator
OVERLOAD PROTECTION	Circuit Breaker	High	Low	Excellent	Small	Fair	Self-contained
	Fuses	Low	Medium	Good	Small	Fair	Require replacement
LOAD TRANSFER DEVICE	Manual Transfer Switch	Low	Low	Excellent	Medium	Poor	Requires attendant
	Automatic Transfer Switch	High	Medium	Good	Large	Poor	With automatic start stop, makes fully automatic installation
GOVERNOR	Mechanical	Low	Low	Excellent	-	-	1 - 3% frequency regulation
	Hydraulic	High	Medium	Good	-	-	Can be operated isochronously
FUEL STORAGE	Base-mounted Tank only	Low	High	Poor	Small	Excellent	High fuel cost due to small quantity purchase; manual priming pump required
	Underground Tank only	Medium	Low	Poor	Medium	Poor	Manual priming pump required
	Elevated Tank only	Low	Low	Good	Medium	Poor	Fire hazard
	Underground with elevated day tank	High	Medium	Excellent	Large	Fair day tank only	Automatic day tank filling pump required for unattended installation

General view of the Jackson Memorial Hospital in Miami, Fla. to the right at which is installed the three Caterpillar D397 diesel electric sets shown below.



memory of this disaster should still be fresh in our minds. It should have served as a tragic reminder that no area is safe from disaster.

Disaster perparations cannot be made during a disaster. Nevertheless how easy it seems to be to rationalize that "we are safe here." History shows how fallacious and calamitous such reasoning can be. What area could possibly be more thoroughly protected by power than Central Manhattan, New York City? Yet just last October a failure in one portion of the utility power equipment caused failure in a whole system! Many substations feeding Central Manhattan were crippled and their innumerable feeder lines "died." Grand Central Station was blacked out for four hours! The Waldorf Astoria Hotel was out of power for a day and a half! How many hospitals can boast that they are as well covered and protected by power as Central Manhattan? Careful examination of most areas reveals that power outages of short duration are commonplace and that outages of hours occur far oftener than realized by the general public. A failure in a limited area draws little attention from newspapers and magazines; it quickly passes from memory. Yet a local power outage can be every bit as disastrous as Hurricane Connie to those involved.

It is through the efforts of organizations such as the American Hospital Association and Civil Defence that the vital need for adequate disaster planning has been brought clearly to the attention of the country's hospitals. In the past few years an increasing number of our hospitals have responded to the advice of such organizations to install adequate standby electrical power. As this type of problem is somewhat unique to hospitals, questions arise about how the needs of a particular

hospital can best be met. Since each standby power installation should be tailored to the individual requirements of the particular hospital involved, the variations in the type of installations are almost limitless. It is natural that this presents a confusing picture to hospital authorities. Fortunately the problem is not complex if we examine the basic factors that should be considered whenever a hospital decides to purchase standby power. In general there are three sources of standby power that are normally considered. These are storage batteries, one or more feeder lines from the utility in addition to the prime feeder, and an engine-generator set.

For many years central battery systems matched to the line voltages were considered suitable to meet a hospital's emergency power requirements. Years of disaster experience have shown that a storage battery system alone is not suitable for hospital emergency power protection. Many disasters where hospitals were involved proved battery systems to be grossly inadequate.[3, 8] Alternating current equipment, which includes all modern hospital electrical equipment except emergency exit and hall lights, becomes paralyzed during outages when the only source of emergency power is the storage battery system.[3] Intercoms, X-ray equipment, iron lungs, incubators, heating equipment, elevators, refrigeration equipment, blood & bone banks, and fluorescent lighting are just a few of the items vulnerable to an alternating current power loss. Storage batteries installed in hospitals are very short-lived when loaded. It is for these reasons that very few new hospitals will rely upon storage batteries as the sole source of emergency power. Today, modern planning calls for storage batteries only to supplement a generator set for a hospital's emergency power system.[4]

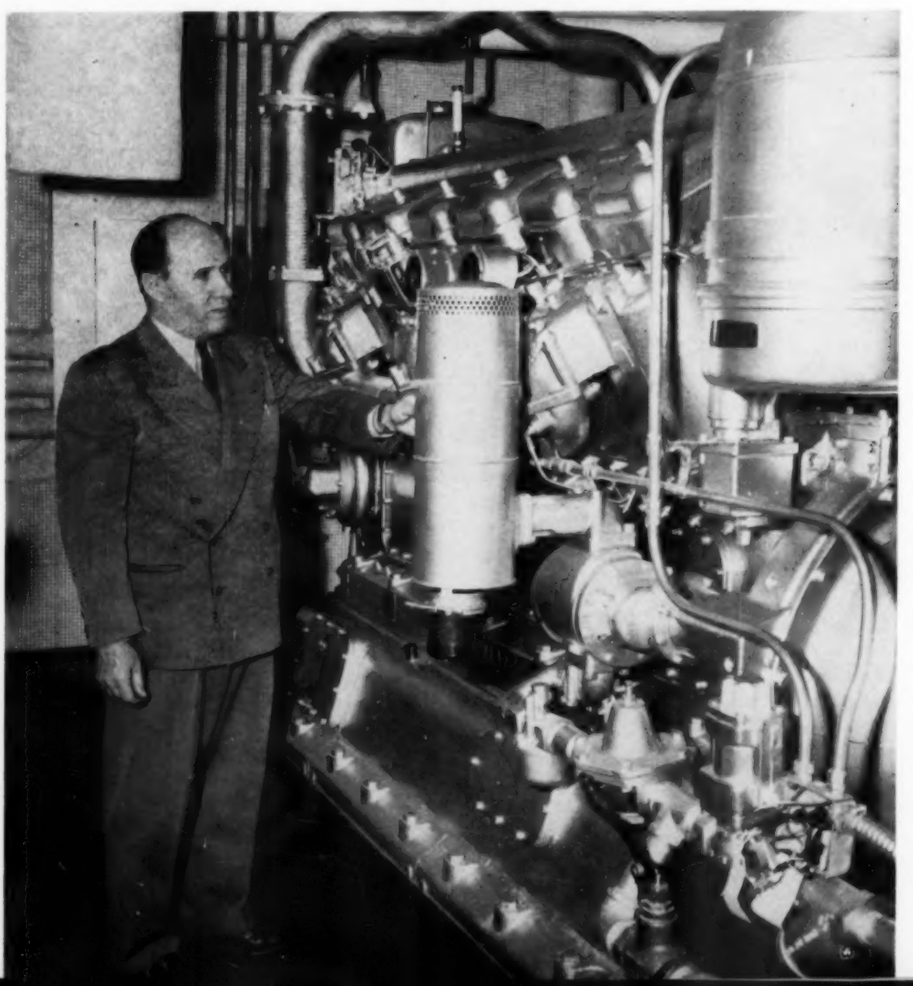
It is certainly advisable for a hospital to have a completely separate secondary utility service in addition to the prime utility service.[5, 6] It is preferable that the secondary service feed in from a separate generating plant over an entirely different route to provide maximum protection.[7] However, it cannot be emphasized too strongly that a secondary feeder from the utility is not in itself adequate emergency power protection. There have been too many examples of disastrous outages, even where multiple utility feeders were installed. An emergency generating set should be installed on the hospital premises, or the hospital is not adequately insured against the possibility of a disastrous power outage.[8, 9, 10, 11] There are a great many types and makes of standby engine-generator sets that are available commercially. A number of these are entirely suitable for use as hospital standby power units. On the other hand, there are types of generator sets that have serious disadvantages when used by a hospital. There are still a few steam plant standby emergency units that are used in hospitals. Generally, these plants are placed where time is never a particularly important element, as quick resumption of power after failure of the utility is out of the question. Such units of course require all the attention, and have the same operating characteristics as any prime steam plant.

Gasoline engine driven generator sets were widely sold as hospital standby units and the initial costs are very low. However, insurance is a problem. Gasoline storage over a period of time is a problem due to deterioration. The dependability of a standby electric set in a hospital is probably the most important feature required. Gasoline engines do not have the same high degree of reliability as diesel engines in this application. Buying a gasoline engine-generator set for hospital standby is much like buying cheap insurance; you cannot depend upon it when you need it. For sizes up to about 15 KW, where diesel engine driven generator sets are not commonly available, gasoline engine-generator sets are used. Above this size, however, diesel-generator sets are most commonly used.[12]

The type of standby diesel electric set arrangement can vary a great deal depending upon the location of the set, the degree of portability desired, the noise levels that can be tolerated, the capabilities of hospital maintenance personnel, etc. A comparison chart is presented that shows the relative advantages and disadvantages of various arrangements normally offered. In some hospitals one arrangement might work very well, whereas in others it would be completely incorrect. It is important to have qualified personnel either from a consulting engineering firm or from a reliable manufacturer's dealer representative make a careful examination of the hospital with the hospital authorities to arrive at the best possible arrangement for a standby electric set. Without this careful personal examination gross errors may result; sometimes these errors may not show themselves until a serious outage occurs. Then it is too late. They can often be very costly to rectify once the installation is made. Qualified engineering personnel from a consulting firm or reliable engine dealer representative help to insure that the hospital gets a unit that is sized to meet the exact load requirements with the correct voltage and frequency characteristics and the safest wiring arrangement made in the most economical manner. They will assure that the unit itself is the easiest to operate and maintain for the particular hospital invloved. After purchasing and installing the standby electric set it is important for the hospital to have the unit thoroughly tested, usually by the engineers making the original analysis and recommendations. Only then can a hospital say with confidence, "We are safe here."

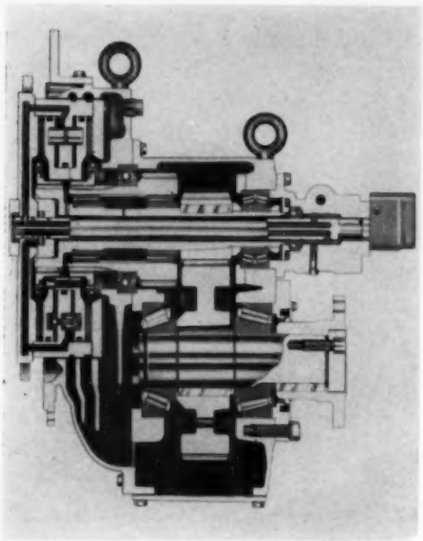
1. John W. Cronin, MD Chief, Division of Hospital Facilities, U.S. Public Health Service, "Main and Emergency Electrical Power Distribution Systems for Hospitals", by Noyce L. Griffin, Electrical Engineer, Div. of Hospital Facilities, Oct., 1951.
2. N. L. Griffin, AIEE, Elect. Engineer, U.S. Public Health Service, Division of Hospital and Medical Facilities, Architectural and Engineering Branch, "Emergency Power for Hospitals."
3. N. L. Griffin, op. cit.
4. N. L. Griffin, op. cit.—For an interesting discussion of the evolution of emergency power, reference is made to the above article.
5. American Hospital Association, "Readings in Disaster Planning for Hospitals," G88-56, 1956.
6. N. L. Griffin, op cit.
7. N. L. Griffin, op. cit.
8. N. L. Griffin, op. cit. (1)
9. N. L. Griffin, op. cit. (2)
10. AHA, op. cit.
11. American Hospital Association, "Recommendations for Installation of Emergency Electrical Systems in Hospitals," December, 1950.
12. N. L. Griffin, op. cit. (2)

William T. Guy, plant superintendent at the Mountainside Hospital in Montclair, N. J. looks over his Caterpillar diesel standby generating set. Unit is equipped with automatic air start-stop system.



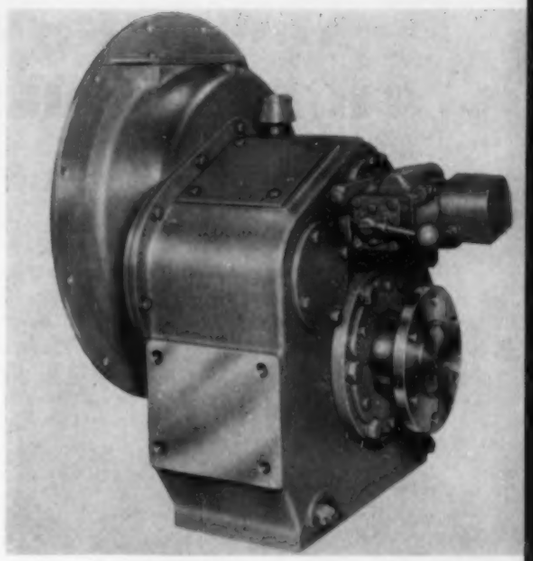
LIGHTWEIGHT, HIGH SPEED REVERSE-REDUCTION GEAR

SNOW-Nabstedt Gear Corp., marine engineers for over half a century, announces a new model in the 3900 series of hydraulically actuated marine reverse-reduction gears. The new 3941 gear has been engineered to meet the demands of modern high speed diesel engines and for either propeller rotation or engine rotation with speeds up to 2400 rpm. This gear offers wide application on fish boats, smaller work boats and pleasure craft. Important advantages to both engine builders and boat operators are its clean design, with few moving parts; lightweight for its transmitted horsepower; and its short, compact design.



Longitudinal cross section through the 3900 series gear.

Complementing the 3900 series hydraulically actuated gears already being used on leading marine engines, the 3941 has a maximum torque of 640 ft.-lbs., for continuous operation (or 265 hp at 2200 rpm) and 750 ft.-lbs., for intermittent or light operation. It can be operated continuously at full power in either forward or reverse at all engine speeds. The unit is offered at present with reduction ratios up to 4.4:1. S-N engineering facilities are available to assist marine architects and boat builders in adapting these gears for all types of installations. Technical literature, power curves and certified installation prints are available by writing the manufacturer.



The new Snow-Nabstedt 3941 gear has a max. torque of 640 ft. lbs. It is presently offered with reduction ratios up to 4.4:1.

7500 SHP TANKER TO BE CONVERTED

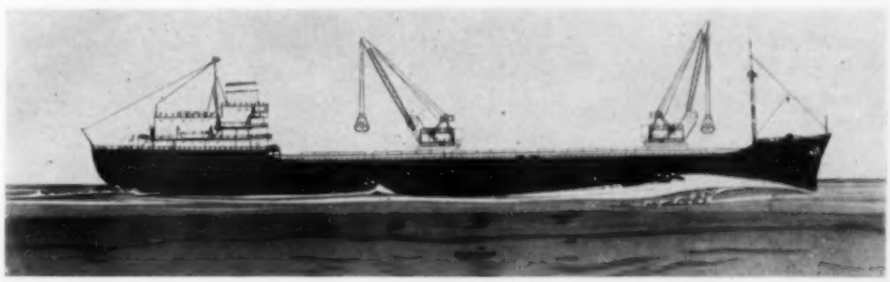
Mississippi Valley Barge Lines Purchases 524 Ft. Single Screw Vessel for Cargo Service Between Gulf Ports

MISSISSIPPI Valley Barge Line Co. has announced the purchase of a 524 ft. tanker, M.S. *Esso Little Rock* for conversion into a self-unloader for the movement of bulk commodities over the Gulf of Mexico, primarily between New Orleans and Tampa, Fla. The vessel will be renamed the M.S. *Trans-Gulf* when it enters Valley Line Service late this summer. The ship is currently at the shipyards of Alabama Dry Dock and Shipbuilding Co., Mobile, Ala., which will handle the conversion in the estimated time of five months. The ship was built by Sun Ship Building and Dry Dock Co. in 1941. She is a single screw vessel, powered by a five-cylinder Sun-Doxford diesel with a normal rating of 7500 shp at 94 rpm.

After conversion, the *Trans-Gulf* will have a capacity of 15,350 gross tons, with a draft of 28 ft. 3 in. when fully-loaded and fully-fueled. The ship has a beam of 70 ft. In converting the *Esso Little Rock*, the existing deckhouse amidships will be removed and the facilities contained therein, including the bridge and wheelhouse, will be added to the deckhouse at the stern of the vessel. Five separate cargo holds will be provided. Transfer of cargo—both loading and unloading—will be accomplished by two large revolving cranes mounted on tracks alongside the cargo holds. Each crane will be able to move the entire length of cargo area and operate in a full 360-degree circle. Around the perimeter of the five-hold cargo area will be a large conveyor system which will move cargo from the cranes to spouts leading over the sides into barges, into the cargo holds, or to shore facilities. All loading and unloading equipment will be completely self-contained aboard the ship.

Though specifications for the cranes and conveyor system have not been finally determined, the marine architects, H. C. Downer and Associates, Inc., Cleveland, Ohio, have as an engineering goal an unloading capacity of 1,500 tons per hr. and a loading capacity of 1,000 tons per hr. At present, it is anticipated that the principal commodities to be transported by the *Trans-Gulf* will be phosphate products westbound from Tampa, and coal and sulphur east-bound into Tampa. Total cost of the ship, including conversion is expected to approximate $3.5 million.

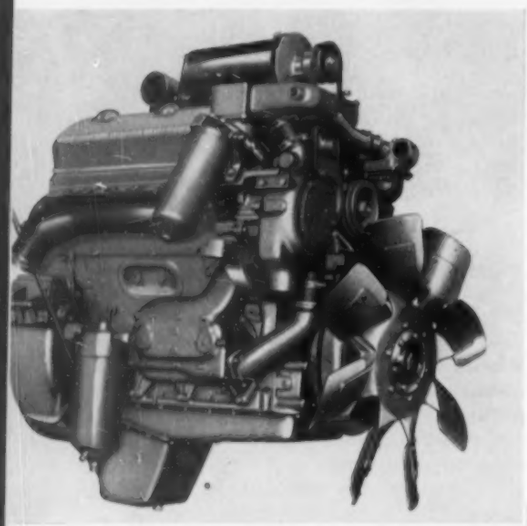
Artist's conception of the 524 ft. M. S. *Trans-Gulf* after conversion. Vessel will retain its 7500 shp Sun-Doxford diesel propulsion plant and have 15,350 gross ton capacity.



NEW GMC "8000" SERIES TILT-CAB DIESEL TRACTORS

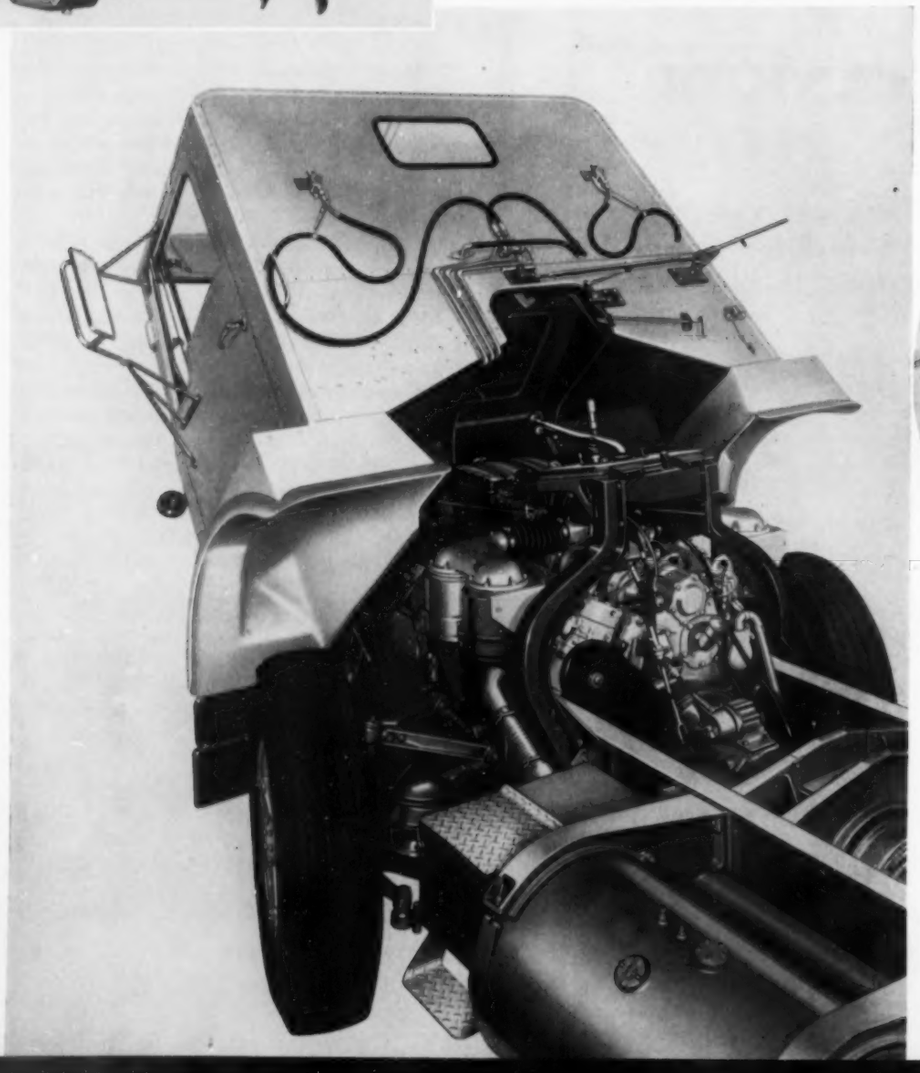
By JIM BROWN

TWO new tilt-cab diesel truck tractors which include many interesting innovations have been introduced recently by the GMC Truck and Coach Division of General Motors. These tractors are new from top to bottom and from bumper to tail-light, not only to the GMC line but to the entire industry in most of their important features. The principal distinguishing features that set them apart from previous truck designs include aluminum cabs, fibre glass fenders, air suspension with independently mounted front wheels and stabilized ride; lighter, prefabricated frames and the new 4-valve in-line and V-type 6-71 GM diesel engines. Innovations that promise increased profit in operation and less trouble in maintenance are found in many other details. The instrument panel wiring, for example, has been completely replaced by two easily removable panels in which clusters of instruments are connected by printed circuits



The compact 6V-71 GM diesel engine rated 189 bhp, 1800 rpm which is available in GMC DFR 8000 tractor.

GMC's new lightweight diesel highway tractor gets a close inspection by C. J. Williams (center) president of Hillside Transit of Milwaukee, Wis. who here discusses it with R. C. Woodhouse, (left) general truck sales manager for GMC and J. M. Gilroy, assistant general sales manager.



The control island in the new GMC highway tractors brings the controls to the driver—within easy reach of his right hand. When the cab is tilted, the island stays in its fixed position.

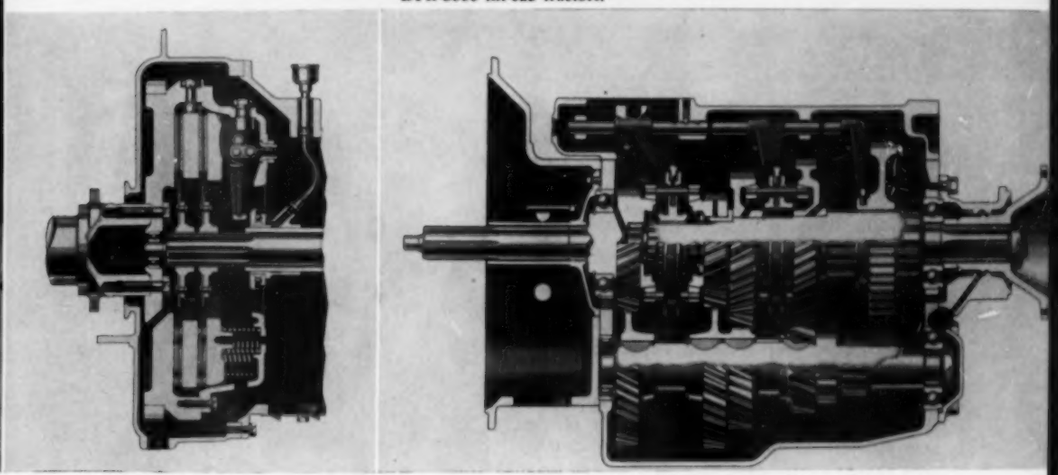
Accessibility and compactness of installation of the 6V-71 GM Diesel in a GMC DFR-8000 tractor with the cabin in tilt position. Engine drives through Lipe-Rollway clutch and Spicer 5-speed transmission.

vide a longer axle spread, is expected to be in production by midsummer. This unit, with the same GVW (gross vehicle weight) rating as the DLR-8000- 29,000 lbs.—has a maximum gross combination weight rating of 76,000 lbs. and will therefore be capable of hauling greater loads.

Weight savings in the GMC series 8000 tractor cabs is effected by the use of aluminum throughout. This lightweight, corrosion resistant metal is used for the cab framing, heavily reinforced pressed floor, welded and riveted exterior roof and back panels and door assemblies. Further weight savings are made by using fibre glass for fenders, head lamp panels and the lattice type grills. The cab ceiling, back and rear corners are lined with carpet grain closed cell sponge rubber for maximum sound deadening and insulation. Large fresh

300 lbs. in weight as compared to the conventional type of pressed channel construction. Capitalizing on the division's experience with air suspension in large cross-country buses, the new GMC trucks have no springs but float on a cushion of metered air. By suspending the front wheels individually the front axle is done away with, further reducing unsprung weight. Air suspension also has the advantage of adusting automatically to the load so that the tractor body rides on an even keel and at a uniform, predetermined height regardless of load or road conditions. Air suspension and the elimination of the front axle are also said to eliminate the side-sway due to spring suspension and to improve steering considerably. Although the new units do not employ power steering, one driver is reported to have said: "That's the best power steering I ever saw in a truck".

Lipe-Rollway 14 in. dual-plate clutch shown left and the Spicer 6853C 5-speed overdrive synchromesh transmission used in the new DLR-8000 and DFR-8000 tilt-cab tractors.



similar to those used by some modern radio and television manufacturers. We believe this is the first time that this technique has been adapted to wiring in any kind of automotive vehicle.

Roughly, it could be said that GMC had three major goals in the design of their new series 8000 DLR and DFR tractors: The elimination of excess size and weight, better performance and roadability and greater comfort and safety for the drivers. These goals they have interpreted as "MP" factors —More Payload, More Performance and More Profit for the users. The result is a lightweight cab which is only 48 in. from bumper to back, mounted directly over the engine on a light but sturdy chassis, within an overall length of 181 in. Total weight savings, as compared to competitive tractors is said to run from 699 to 2,097 lbs. Tractor weight savings can usually be converted to more payload without additional hauling cost, and this means more profit for the operator.

The GMC model DLR-8000 tractor, with front wheels set back 50 in. from the bumper was designed to haul a maximum of 61,000 lbs. gross combination weight-tractor, trailer and load. Beginning early in 1959, 25 of these units were placed in the hands of fleet operators for thorough 60-day road demonstrations, and the tractor was in production by April, 1959. The model DFR-8000, with front wheels set back only 28 in. in order to provide

air ventilators, a fully adjustable seat, a wide, flat windshield, wide (90° opening) doors and big side windows contribute to the driver's comfort and to maximum visibility and safety.

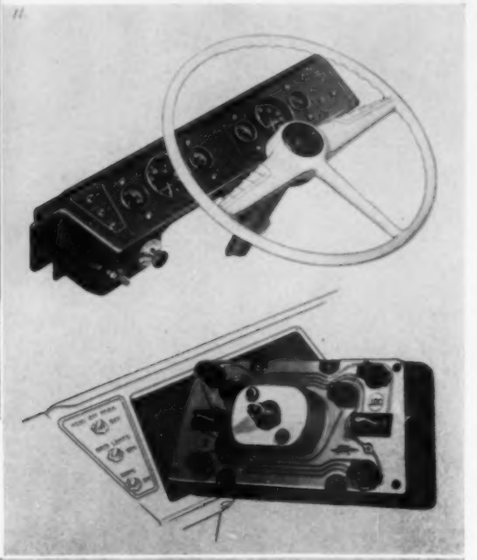
The weight of the cab is counterbalanced by torsion bars, making it easy for one man to tilt it forward in order to get at the engine for maintenance. The gear shift lever, hand brake lever, emergency engine stop and other controls are mounted in a center island which does not raise with the cab. This does away with loose operating cables beneath the cab—cables which could otherwise kink and get out of order every time the cab is tilted and replaced. An optional design of the cab provides a sleeper compartment behind the driver's seat, but the overall design and fifth wheel location are such that the front and rear axle loadings are virtually unaffected by the addition of a sleeping compartment.

Frames for the DLR-8000 and DFR-8000 GMC tractors are built up by continuous-welding $\frac{3}{16}$ in. SAE 50 high tensile steel flanges to light steel vertical members, forming a deep welded I-beam. This carefully designed, fabricated chassis provides great strength and rigidity with a saving of up to

The new GMC 8000 series tractors are powered by GM diesel engines, 6-71 inline for the DLR and 6V-71 for the DFR. These 4-valve head, 2-cycle power plants lends themselves well to cab-over-engine mounting. Only a few inches of the inline engine project from the rear of the short cab and the 6V-71 model tucks away completely beneath the cab. Both of the diesels are rated at 189 bhp at 1800 rpm by GMC, with 210 bhp available. An interesting feature of the GM diesel engine application in these tractors is that the cooling system includes a hydraulically driven fan which is thermostatically controlled by the coolant temperature.

Shown here is the forward section of the DFR (long wheel base) tractor. The unit is equipped with a GM diesel 6V-71 engine.

DLR-8000, with aluminum tilt-cab only 48 in. from bumper to back of cab. This GMC and its counterpart, the DFR-8000, are designed to haul loads of from 61,000 to 76,000 lbs. GCW respectively.

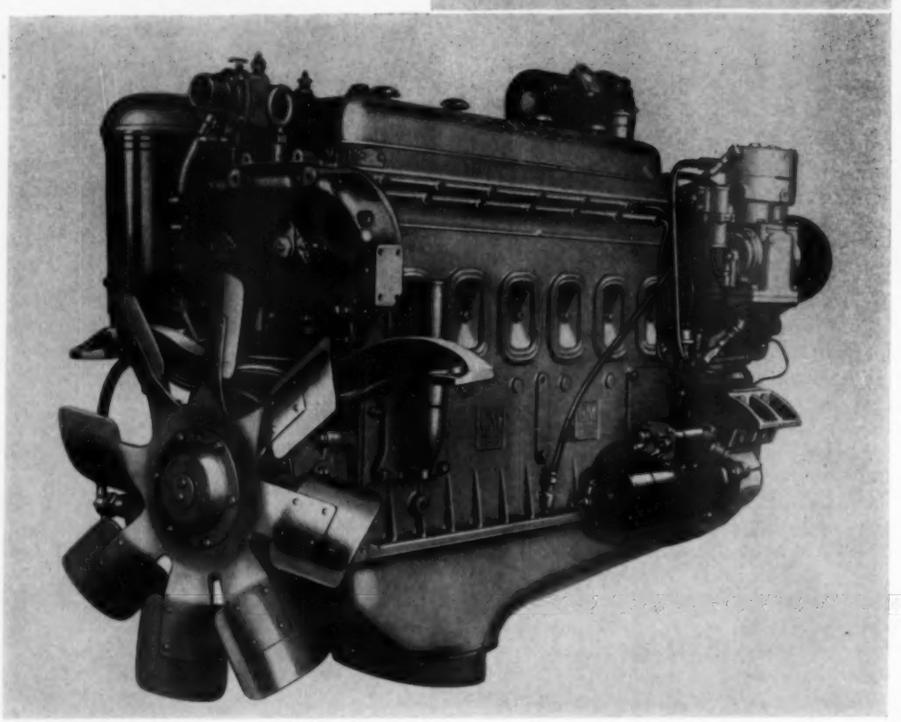


New design in truck instrument panels on series 8000 tractors. Instrument cluster is removed from the panel by a spring release catch. All wiring is a printed metallic circuit, shown in the lower, "back side" view.

Since the fan is in full use only after the engine reaches or tends to exceed the optimum temperature, this can reduce the parasitic load by as much as 7 bhp.

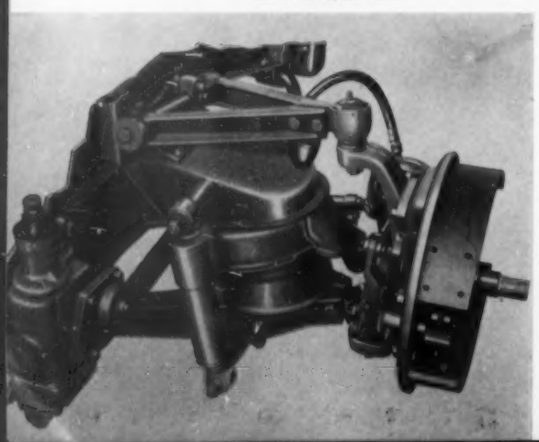
Back of the engine is a Lipe-Rollway 14 in. direct-pressure dual plate clutch. The transmission is a Spicer 6853C 5-speed synchromesh overdrive, which supplies power to a GMC spiral bevel 2-speed rear axle so that there are ten speeds available in forward gear and 2 reverse speeds. The standard rear axle and suspension, rated at 18,000 lbs., has gear ratios of 4.33:1 and 5.91:1. The optional rear axle ratios are 4.87:1 and 6.65:1. Movement of the axle with respect to the frame is controlled by extra rugged torque arms. The fast-recovery piston type air suspension bellows are located ahead of the rear axle, between the frame and heavy duty channel type radius rods which connect the rear axle and the frame in the approximate position that springs should be mounted in, if there were any.

It was mentioned above that 25 of the DLR-8000 units which were built by January 1959 were placed in the hands of experienced fleet operators



GM Diesel 6-71 inline automotive engine. The 12 cfm air compressor mounted to the rear supplies air to a single tank which serves the air suspension units, brakes and air-operated windshield wipers.

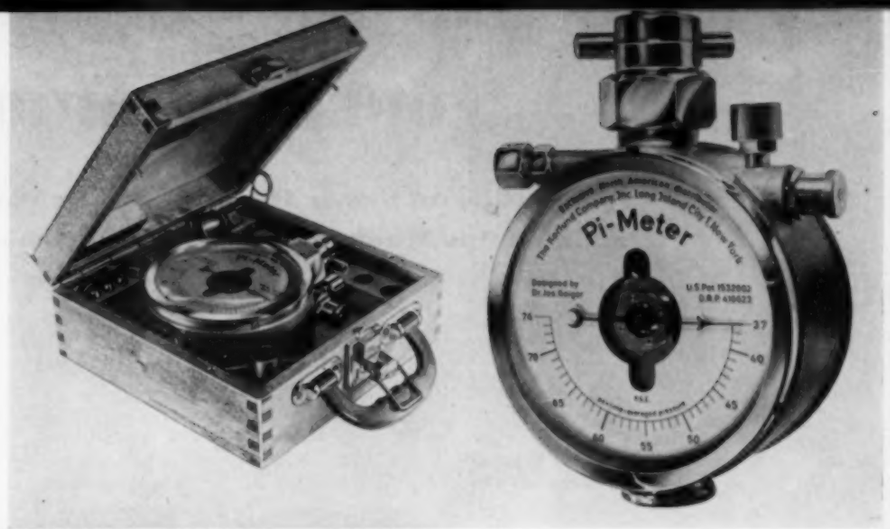
GMC truck in its new series 8000 trucks uses independent front wheel suspension takes a load of 11,000 lbs. Convolute type of air cylinder is standard on the new tractors, and permits a design that brings their weight down to 9,987 lbs.



for critical 60-day road demonstrations under actual operating conditions. The sales engineers at GMC Truck and Coach allowed us to examine a file of report forms which had been sent in by these operators and which reported in detail trip mileages, weather and load conditions, loading, fuel and oil consumption and driver reaction. The reports were uniformly good and in many cases highly enthusiastic. We tried to get some idea of reported fuel mileage, but with loads varying from nothing to full capacity, with all kinds of drivers and with all kinds of road conditions it is difficult to generalize. The mileages we saw ran from 5.2 mpg to 8 mpg. Most of the drivers' reports on visibility, performance, comfort, rideability and handling were "good", "excellent", etc.

The trucking industry is interested most in carrying greater payloads within the current restrictions on vehicle lengths and wheel loadings, reducing downtime, fuel and maintenance costs and to further improving their already high safety record through reduced driver fatigue and improved equipment. The new GMC DLR-8000 and DFR-8000 tilt-cab tractors appear to be a good step in the right direction.

DIRECT READING PRESSURE METER



PERFORMANCE meter for multi-cylinder diesel and natural gas engines that permits rapid adjustment and balancing of cylinder loads of the engine, and measurement of power output has been announced by The Korfund Co., Inc. This instrument, the Pi-Meter, can be quickly attached to a cylinder's pressure tap, and is simple and trouble-free in its construction. It reads time-averaged pressure which is related to indicated mean effective pressure. Since this pressure is read directly on the meter's dial in psi while the engine is running, it can be used easily. Five different springs used within the instrument will accommodate a wide enough pressure range to adapt it for use with any type of reciprocating engine.

Balancing loads on the cylinders of an engine assures that each cylinder is providing its fair share of the total output for maximum efficiency and lowest fuel costs, and prevents early failure due to overloading of any one cylinder. After the meter has located an unbalance of load the cause of the trouble—ignition, fuel, combustion quality, valving, piston rings, etc.—can be found. Unlike standard engine indicators, the Pi-Meter has no upper speed limit (its lower limit is 80 rpm), and is therefore especially useful in determining the power output of high speed engines in the field, once a chart has been plotted relating the Pi-Meter reading to the mean effective pressure of the engine.

The gas pressure acts on a piston and rod (Fig. 1; 7) complete with lever and pinion transmission system (Fig. 2; b, c) with a large transmission ratio, on a flywheel (Fig. 1; 14) located in the rear of the instrument. The effective mass of the flywheel, derived from the square of the transmission ratio, receives the pressure fluctuations acting on the piston, so that this takes up a position corresponding to the time-averaged pressure. This position is

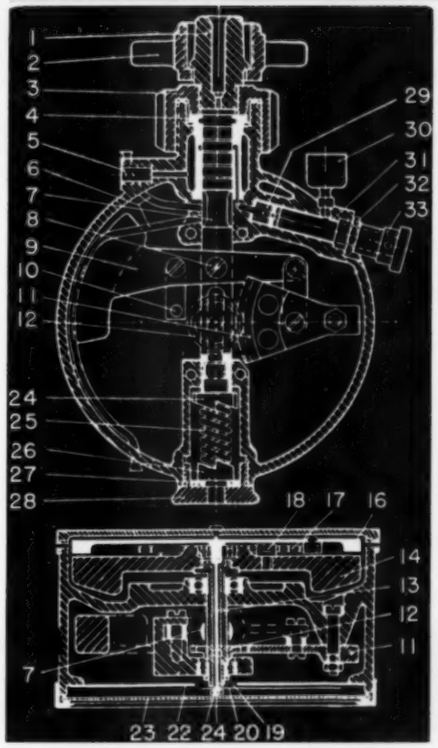


Fig. 1

maintained in equilibrium by an easily interchangeable spring (Fig. 2; f) similar to an indicator spring, and located in a relatively cool position opposite the cylinder. Low natural frequencies are achieved by elastically connecting an additional centrifugal mass (Fig. 1; 16) with the main mass. The pointer of the instrument is mounted on the shaft of this additional mass. For continuous service the instrument is equipped with devices for cooling and lubrication. A hollow space surrounding the cylinder space enables water cooling to be applied to the instrument through the connections (Fig. 2; c). For lubrication of the contact surfaces of the piston during service, it is equipped with a hand pump (Fig. 2; d) with check valve.

It is the effect of an inert mass to produce a mean (or averaged) value in relation to time (time-averaged pressure =PZ); whereas for calculation of the indicated power the mean pressure Pi in relation to the travel (stroke) of the piston is required. The difference between these two kinds of pressure, called Time-pressure and Stroke-pressure, for short, is illustrated in Figs. 3, 4, 5. The open time diagram of a four-stroke engine (Fig. 3) recorded by means of a time or crank-travel indicator, yields

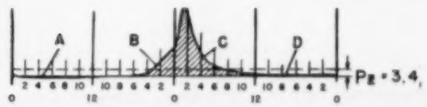


Fig. 3

the time-averaged pressure PZ=3.4, directly indicated by the Pi-Meter. The closed indicator diagram (piston stroke diagram, Fig. 4), exactly corresponding to the open time diagram, yields the mean stroke pressure Pi=5.3, which may be used to compute the power. In all reciprocating engines there is a direct, and often a rectilinear relation between these two pressures, as shown in Fig. 5.

According to Korfund's Technical Information Manager, S. Lee Perlow, these Pi-Meters are now in use in the southwest and midwest by gas and oil pumping companies as well as by other operators of diesel and natural gas engines. The unit weighs 9 lbs. and measures 6 in. in diameter by 3 in. thick. It is supplied in a mahogany carrying case 9½ x 8½ x 4 in., with standard accessories.

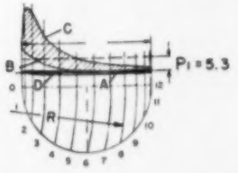


Fig. 4

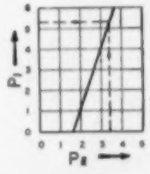


Fig. 5

EXPLANATION OF FIG. No. 1

1. Connecting cone
2. Coupling nut
3. Hexagon head
4. Cylinder
5. Cooling-water connection
6. Oil drain pipes
7. Piston rod
8. Coupling screw
9. Transmission lever with counter weight
10. Anchoring point in housing
11. Pinion segment
12. Pinion
13. Shaft of main mass
14. Main mass (flywheel)
16. Additional mass
17. Helical spring
18. Mounting screw
19. Pointer shaft
20. Pointer
21. Pointer nut
22. Scale
23. Glass cover
24. Spring head
25. Spring
26. Spring base
27. Intermediate plate
28. Screw for spring base
29. Non-return valve
30. Lubricating oil reservoir
31. Bush for oil pump
32. Thread inset for oil pump
33. Ram for oil pump

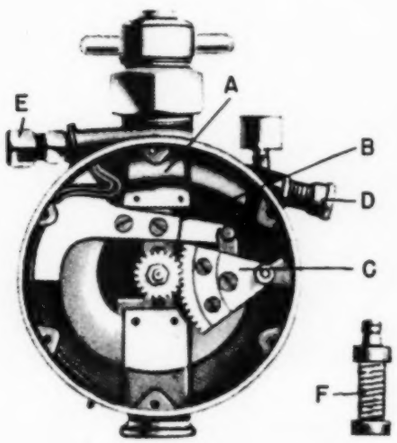


Fig. 2

OBERLIN, OHIO

Operating on Gas or Oil, 3500 HP Fairbanks-Morse Engine Helps Municipal Power Plant Achieve Economies In Growing College Town

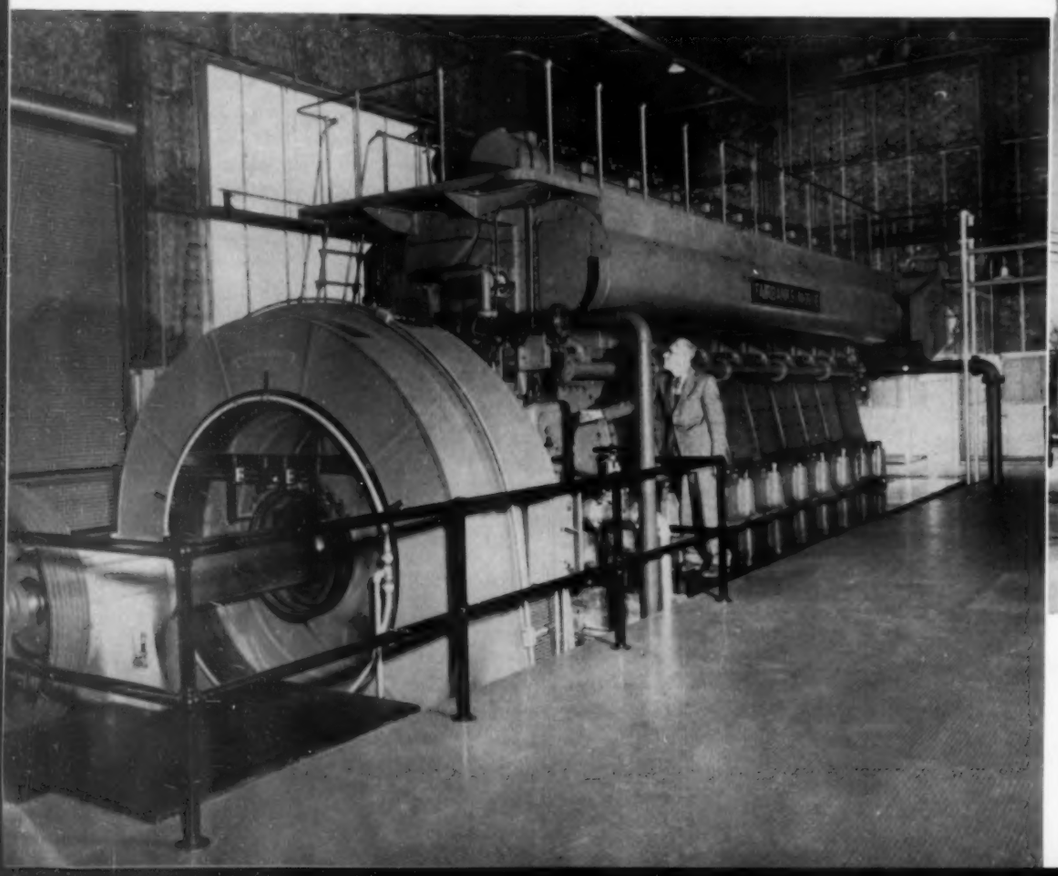
By DWIGHT P. ROBISON

A BIG new diesel in a college town is giving some lessons in operating economy. The town is Oberlin, Ohio, seat of Oberlin College. The engine is a 3500 hp Fairbanks-Morse dual-fuel diesel which went into full service in September 1958 in the municipal power plant. Operating on fuel oil alone for a two-week period in December, the engine averaged 14.9 kwhs/gal. of fuel consumed and reached an impressive 15.6 kwhs/gal. when load factor was most favorable. Running as a dual-fuel unit for the full month of October, the engine averaged 10.88 cu. ft. of natural gas and 0.00592 gals. of pilot oil/kwh.

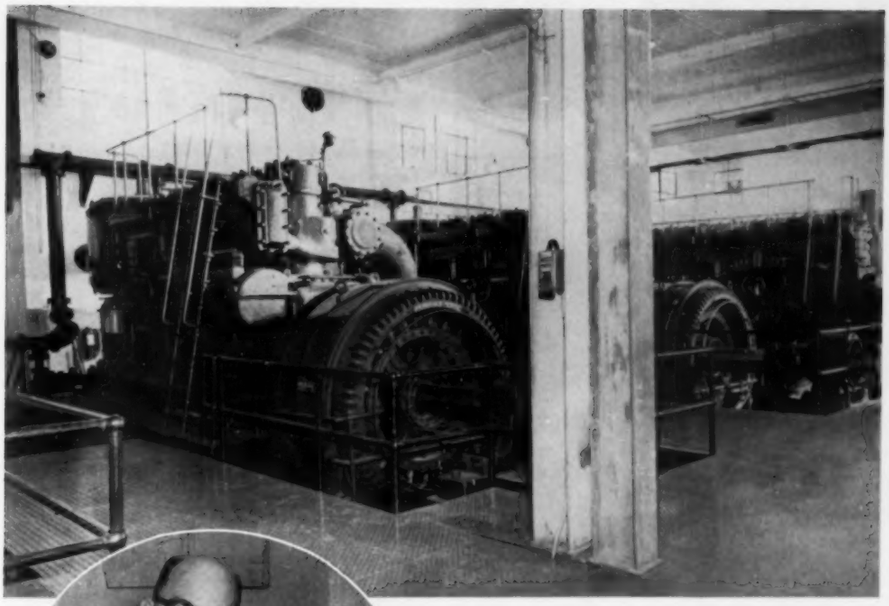
The new unit is the seventh Fairbanks-Morse diesel to serve Oberlin since the plant was started in 1934 to provide the city with a more dependable and economical power supply. Six of those units are in service today. The original installation consisted of two diesels, each rated at 875 hp and one 600 hp. By 1940, peak load reached 1410 kw, well above the firm capacity of 1021 kw, and the following year saw the installation of a 1400 hp engine. The story was repeated again and again. Peak load in 1947 was 2190 kw compared with a firm capacity of 1627 kw and in 1948 was installed a 1600 hp opposed-piston diesel. The City managed to stay ahead of growing demand with the installation of a big dual-fuel diesel in 1951. This unit, rated at 2800 hp, replaced the little 600 hp engine and raised firm capacity to 3329 kw. In the ensuing years, the galloping load again took the bit in its teeth and by 1957 the peak reached 3525 kw, well above firm capacity.

Determined to extend the range of load growth anticipation, the City retained the Cleveland consulting engineers W. Vance Middough & Associates to chart future requirements and plan necessary plant expansion. The engineers predicted that demand would reach 5570 kw in 1965 and recommended substantial increase in generating capacity. The engine chosen was another Fairbanks-Morse dual-fuel diesel, a 10-cylinder unit with 18 in. bore and 27 in. stroke, rated at 3500 hp at 277 rpm. The new engine drives a 2500 kw F-M alternator delivering 3 phase, 60 cycle, 4160 volt current. The big engine was first started up in August, 1958, and went into full service in September, promptly taking over as the plant's base load prime mover. September production was 462,000 kwhs in 249 hours of operation and this rose to December totals of 953,400 kwhs in 576 hours. In her first four months of service, the engine produced 2,562,000 kwhs, actually 48 per cent of the plant total. In the same period, the 2800 hp unit turned out 1,708,800 kwhs, another 32 per cent of plant output. This reflects the operating schedule set up by the Plant Superintendent Frank Craig. The No. 6 (3500 hp) engine normally runs from about 8 am. to 11 pm. six days a week with the No. 5 (2800 hp) unit taking over for the night and the full 24 hours on Sunday. Both these engines are used to handle the winter peaks and other diesels are called on as necessary.

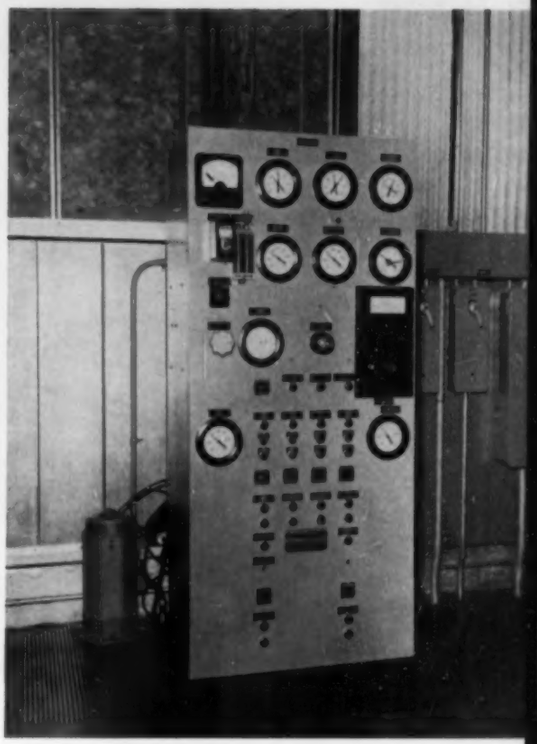
The ability of the two biggest engines to utilize natural gas has been one factor in the reduction



Plant Superintendent Frank Craig starts up the new 3500 hp Fairbanks-Morse dual-fuel engine. Note Young intercooler and Woodward Governor.



Left to right are: two 875 hp diesels installed in 1934, a 1400 hp installed in 1941, and a 1600 hp opposed-piston diesel installed in 1948.



Beside the new F-M engine is a Lake Shore Electric panel which holds an Alnor pyrometer, Marshalltown pressure and temperature gauges, alarms, GE ammeter and voltage relay plus other controls.

Pictured at his desk in department headquarters building near the plant is Electrical Department Manager Howard D. Reichenbach.

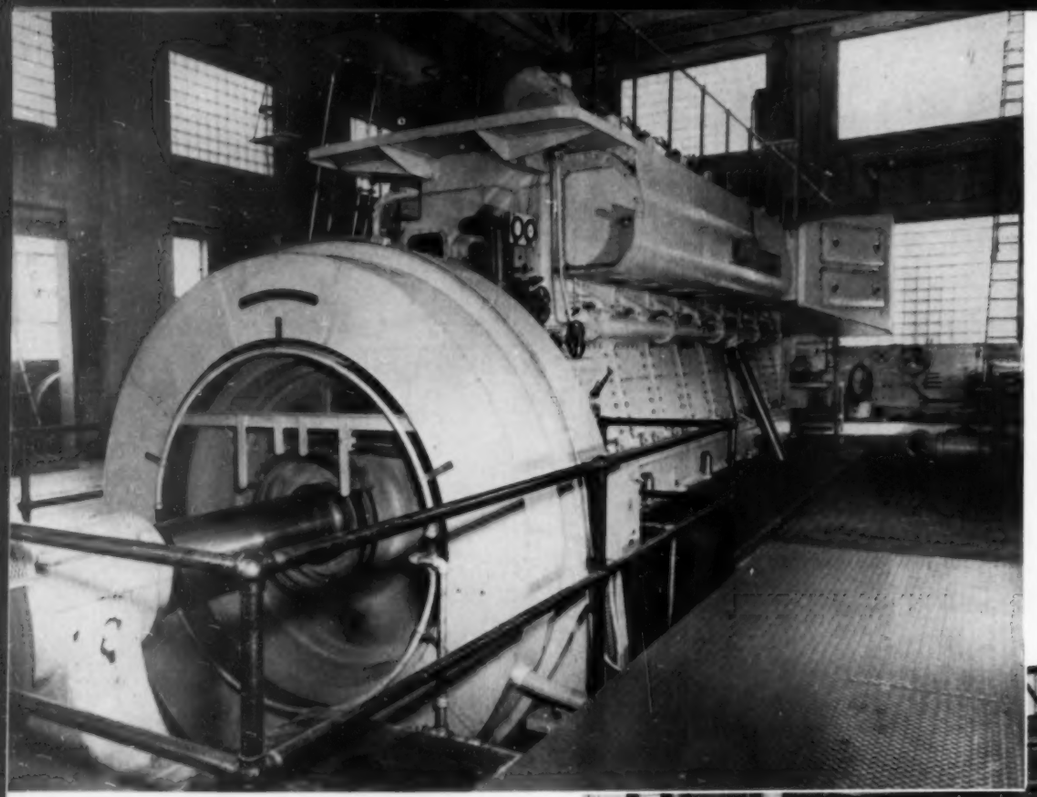
The new Fairbanks-Morse engine was installed in a new wing set at right angles to the original plant. This view shows the Burgess-Manning exhaust snubber.

of fuel costs, but improved engine efficiency has been equally important. In 1956, the plant produced 13,861,400 kwhs on 1,076,460 gal. of fuel oil, an average of 12.87 kwhs per gal. Figuring the oil at its current price of 10.5 cents a gal., this meant a fuel cost of 8.158 mills per kwh. Natural gas became available in mid-year of 1957 but it was scarcely a cheap fuel bananza, priced at 62.5 cents per thousand cu. ft. for the first 5,000 mcf and 51.5 cents per mcf for the next 14,000. The 2800 hp engine operated for six months of the year as a straight diesel and the second six months as a dual-fuel, shaving the plant average fuel cost for the year to 7.903 mills per kwh. Gas availability had greater effect in 1958 with the No. 5 engine running on gas for most of the year and the new dual-fuel unit going into service in September. As a result, plant average fuel cost was cut to 7.440 mills. For the full year, the pair of big engines produced 8,946,800 kwhs while consuming 123,420 gal. of oil and 86,217 mcf of gas. This meant an average fuel cost of 6.943 mills per kwh.

The new engine was installed in a new wing set at right angles to the original building. At the same time, a well-instrumented 20-panel totally-enclosed unit-type switchboard was put in and voltage was raised from 2400 to 4160, all without disruption of service. To achieve this, 4160-volt current from the new engine was fed through a temporary transformer installation to the 2400-volt system. The same expedient was used as each generator was switched to the new voltage until the new board was ready and the plant could switch over to 4160 volts. Wherever practicable, the new engine was integrated with existing plant auxiliary systems. The same lubricating oil is used for all the engines except the OP which takes a different weight. The lube is purchased in economical tank-car lots and stored in a 10,000-gal. tank from which it is pumped to the engines for makeup. The No. 2 diesel fuel is stored in three 10,000-gal. tanks and transferred as required to individual day tanks in a fireproof chamber in the plant basement. There is a 1,000-gal. tank for each of the big engines and 675 gal. tanks for the smaller units.

The growing capacity and production of the power plant have met the expanding requirements of the community. In 1935, the plant's first year, peak load was just 780 kw and output totaled 2,443,000 kwhs to satisfy the needs of a population of about 3,000. Twenty-four years later, peak was 3,750 kw and production 15,081,800 kwhs for a town of 7,500 population. Oberlin continues to be a college town with 20 instructional buildings and 26 residence halls, a teaching faculty of 200 and a student body of more than 2,000. The college takes about 25 per cent of the plant's output, with another 36 per cent going to residential consumers, 17 per cent to commercial users, and the balance to small industry, street lighting and consumers.

Throughout its 24-year history, the Oberlin municipal power plant has paid its own way and returned a profit. Electrical Department Manager Howard D. Reichenbach points out a number of

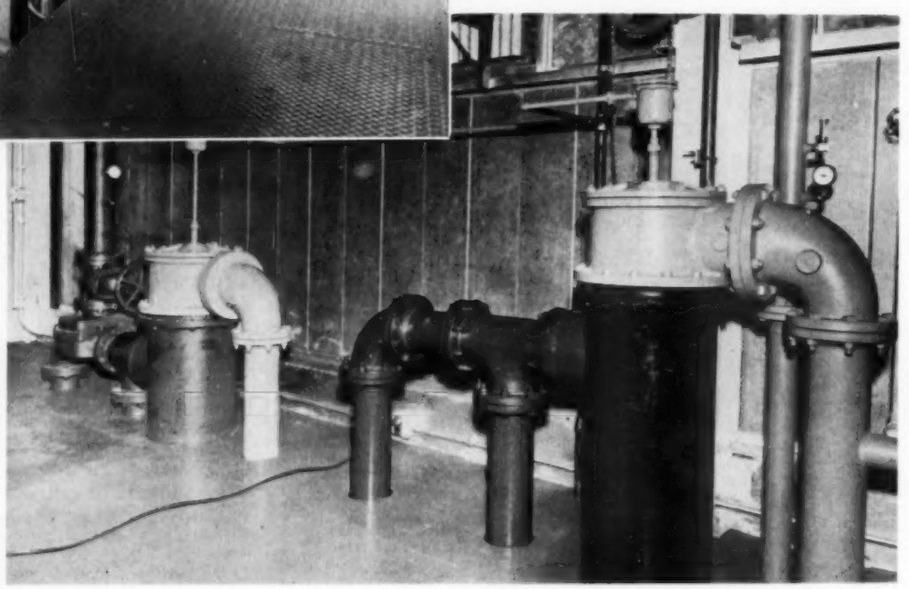


Second largest engine at Oberlin plant is this 2800 hp Fairbanks-Morse dual-fuel diesel installed in 1951.

important benefits to the community. First, the plant provides service to consumers at rates lower than competitive schedules in nearby towns. The electrical department regularly donates current valued at $20,000 a year for street lighting. The department pays for everything it uses, even rent for space in City Hall. Also, the department itself is an important local industry with a payroll of about $100,000 a year. The electrical department is operated under the policy supervision of a Public Utilities Commission consisting of: Homer Blanchard, Carl Breuning, Carl Howe, Ben Lewis and Edward Trautz. Major decisions are passed on by the Oberlin City Council: James F. Long, chairman; Fred Comings, vice-chairman; Andrew Stofan, Wade Ellis, Harold Gibson, E. P. Zahm and W. F. Hellmuth. Richard Dunn is City Manager.

Principal Equipment Serving 3500 HP F-M Engine

Engine	Fairbanks-Morse
Alternator	Fairbanks-Morse
Governor	Woodward
Engine panel	Lake Shore Electric
Exhaust pyrometer	Alnor
Pressure and temperature gauges	Marshalltown
Jacket water heat exchanger	Ross
Thermostatic valve	Amot
Lubricating oil	Texaco
Lube cooler	Ross
Lube full-flow filter	Air-Maze
Auxiliary lube pump	Roper
Fuel oil	Sun Oil
Fuel meter	Buffalo
Air filter	Air-Maze
Fuel filter	Nugent
Scavenging air blower	Roots-Connersville
Intercooler	Young
Exhaust snubber	Burgess-Manning



The Ross jacket water heat exchanger and lube cooler serving the big F-M engine extend up from the basement into the engine room, facilitating maintenance.

Scavenging air for the new 3500 hp engine is handled by this 17,700 cfm Roots-Connersville blower driven by a 300 hp motor.

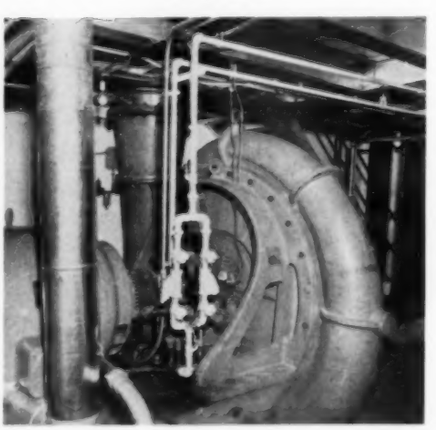


TABLE I

	Kilowatt Hrs. Generated			Gallons Fuel Oil			MCF Gas		
1958	3500 Hp	2800 Hp	Plant	3500 Hp	2800 Hp	Plant	3500 Hp	2800 Hp	Plant
Jan.	--	805,000	1,456,300	--	5,240	57,190	--	7,875	7,875
Feb.	--	484,000	1,318,600	--	5,340	71,220	--	4,483	4,483
Mar.	--	731,000	1,365,300	--	5,230	54,550	--	7,528	7,528
Apr.	--	639,000	1,192,500	--	5,020	48,750	--	6,894	6,894
May	--	650,000	1,228,500	--	5,140	51,000	--	7,220	7,220
June	--	513,000	1,019,200	--	3,920	44,860	--	5,771	5,771
July	--	338,000	1,046,300	--	3,870	60,470		3,520	3,520
Aug.	--	516,000	1,017,700	--	4,230	44,780	--	5,640	5,640
Sep.	462,000	457,200	1,194,600	4,460	4,420	32,100	5,466	4,574	10,040
Oct.	583,800	462,000	1,344,000	3,460	4,490	33,720	6,354	5,206	11,560
Nov.	562,800	462,000	1,383,200	3,340	6,030	39,200	6,472	4,215	10,687
Dec.	953,400	527,600	1,415,600	*34,530	*24,700	79,370	4,999	--	4,999
TOTALS	2,562,000	6,384,800	15,081,800	45,790	77,630	617,210	23,291	62,926	86,217

(*) Plant operated on oil alone for 3 weeks.

2400 HP LOCOMOTIVES TO SANTA FE

The Sante Fe Railroad will use the six-motor units on Los Angeles-to-Chicago freight runs. The DL-600 is powered by Alco 2400 hp diesel.

ALCO Products, Inc. has started deliveries to the Atchison, Topeka and Santa Fe Railway of 24 locomotives with one of the highest mainline hauling capacity ever built into a diesel-electric unit. The locomotives—all turbocharged 2400 hp Alco DL-600's—will be used on the Santa Fe between Los Angeles and Chicago in freight service. They are similar, but not identical, to DL-600's previously delivered to the railroad. The total value of the locomotives on the current order was not announced. Alco expects to complete shipment of the 24 units in July.

The locomotives carry six traction motors with pulling capacity greater than any others available. The heavy-duty DL-600 design was pioneered by Alco in 1953, but the units now rolling from the Schenectady shops are the first for high-speed, through freight service. Alco said it understood the Santa Fe plans to use the locomotives in three or four-unit multiple service. With each locomotive's 16-cylinder model 251 turbocharged diesel engine rated at 2550 gross hp, this would give a four-unit multiple a total of 10,200 gross hp. The locomotives are 67 ft. long and weigh 192½ tons each. They have a fuel capacity of 3350 gals. of diesel oil.

UNIQUE STROBOSCOPIC-TACHOMETER

KENT-Moore Organization, Inc., engineers and manufacturers of service tools, equipment and test instruments, have developed a new stroboscopic-tachometer. Called the Uni-Tac, this instrument permits accurate determination of rpm of any rotating or reciprocating mechanism. Uni-Tac is unique in that it is completely portable and self-contained in operation without requiring an external power source or a mechanical attachment to the mechanism to be tested.

Uni-Tac was developed primarily to provide business and industry with a much needed instrument for determining rpm factors. The goal of Kent-Moore's research and engineering departments was to develop an economical instrument to measure rpm without requiring mechanical contact. Uni-Tac was put through extensive field tests under all possible adverse conditions. Once finalized, Uni-Tac became the economical, completely self-contained probe type stroboscopic-tachometer industry has been asking for. One of Uni-Tac's uses is its role in correct engine adjusting for peak fuel economy and performance. To do this, crankshaft speed must be observed within narrow limits.

Until the development of this revolutionary device, a hand tachometer was the only commercially practical means of determining rpm. In many installations, it is impossible or positively dangerous to effect a mechanical contact and obtain reliable readings. In solving this problem, the Uni-Tac has also solved numerous applications in other fields. It will record the rpm of any rotating object visible to the operator. Basically, it is a stroboscopic-tachometer utilizing a controllable intermittent flash of light. A transistorized circuit utilizing new components and processes, allows the device to be sold at a price that is comparable with quality hand tachometer sets.

Operation of the Uni-Tac is very simple. Pick out a bolthead, a nut, or a projection on the rotating object. On a plain object, such as a shaft, the tip of a fan blade, etc., stick a piece of the tape furnished with the Uni-Tac. The instrument has a coarse and a fine control knob; advance the light flash to the same speed as the rotating object (the mark will appear to stand still) and read the rpm on the meter. Accuracy is comparable to any quality hand tachometer on the market. The Uni-Tac has successfully completed exhaustive field tests by manufacturers of motor trucks, motor coaches, diesel engines, construction machinery and vehicles, agricultural tractors and implements, and many others. It is being actively promoted for service operations on on-highway and off-highway equipment, and new uses are constantly being discovered in entirely unrelated industries.

ANNA QUARRIES TURNS TO LARGER EQUIPMENT

By L. H. HOUCK

ONE of the major requirements for criss-crossing the nation with Interstate highways is an adequate volume of good rock aggregates. Since all limestone does not meet the rigid state and federal specifications, it behooves those companies producing acceptable aggregate to increase its tonnage to the limit. Here's where equipment economics comes into the picture. Since there are only so many swings of a shovel dipper in each 24 hrs., the one-yard shovel must give way to the three, and the three to the six, so that each bite brings more rock for the maw of the mill that must also have bigger crushers and screens with greater capacity. There's a limit to truck speed on quarry roads, so increased tonnage means more trucks with greater hauling capacity.

How these problems are being solved at the half-century old Anna Quarries at Anna, Ill., is an example of what is being done in quarries all over the country to get acceptable aggregate for the booming construction program. Because aggregate production begins with breaking rock we can start there with the changes made at Anna by G. H. Rippetoe, vice-president and general manager, one of the widely experienced rock men of the country. Anna replaced two churn drills used for boring blast holes with one Ingersoll-Rand Crawl-IR drill and a 600 cfm Ingersoll-Rand Gyro-Flo air compressor, reduced a drilling crew of four to two, eliminated delays for forge sharpening of churn drill bits, and drilled twice the footage.

The Crawl-IR is a comparatively recent development superseding the wagon drill, with which one man can drill and pull his own compressor along behind him, using the air motor on the crawler tracks on which his drill is mounted. Time was

General Electric 45-ton diesel-electric locomotive used to switch railroad cars. Power is a pair of 250 hp Cummins diesels.

10 yd. Koehring dumps into 40 in. Cedar Rapids feeder. Ten ton cars haul rock out of pit to the mill crusher.

when the driller had to call for a tractor or a truck when he wanted to make a new setup. Anna drills blast holes on a 12 by 10 ft. patern, 12 ft. between holes, 10 ft. between rows, shoots 70 holes loaded with 60 per cent ammonia Atlas dynamite in 5-lb. 2½x24-in. sticks, at a time, getting 3½ tons of rock per pound of dynamite, 35,000 tons per round. This drill powered with air from the I-R compressor which has a 6-71 GM diesel, is drilling a 35 ft. hole, 3 ins. in diameter in the high grade Salem and St. Louis strata of limestone in 45 minutes. It uses Ingersoll-Rand carbide tipped regrindable bits. W. L. Kemp, mine superintendent said 100,000 to 125,000 tons of rock had been produced with seven bits. They are resharpened on the job.

Veteran Bucyrus-Erie 54-B with 257 hp Allis-Chalmers diesel drops its 2½ cu. yd. load into one of the new 10 cu. yd. Koehring Dumptors with 6-71 GM diesel engines. D4 Caterpillar at right is used on cleanup.

The rock is pulled out of the pit with two 10-ton electrically operated cable cars up inclined tracks to the 2500 ton electric mill. The Dumptors keep the cable cars humping at the rate of 30 cars per hr. The mill normally produces 2500 tons of crushed and sized aggregate per 8 hr. shift but by increasing the various capacities of the equipment it can produce 450 tons per hr. or more. Railroad tracks under the mill's hopper provide car loading as well as truck loading. Railroad switching for mill and adjacent siding is handled by a General Electric 45-ton diesel-electric locomotive. The diesel engines consist of a pair of Cummins 250 hp 6 cylinder engines. Anna Quarries work 12 months a year, stockpiling material during months when construction is shut down. These stockpiles are then available for loading into trucks or loading out railroad cars as the material is in demand throughout a wide area.

Increasing the rate at which the material is loaded

Scoopmobile with 3½ yd. bucket and Cummins diesel being tried out at Anna Quarries to increase its truck and railroad car loading capacity from stockpiles.

Ingersoll-Rand Crawl-IR puts a 3 in. hole down 35 ft. in 45 min. 600 cfm Gyro-Flo Ingersoll-Rand compressor with 6-71 GM diesel clings to quarry wall.

The open pit at Anna Quarries is more than 50 years old and the present company has been operating it for the past 30 years. It is 175 ft. deep and coverages an area of 13 acres. Blasted rock is loaded into Koehring Dumptors by a 54-B Bucyrus-Erie shovel, 2½ yd. capacity, and a 44-B Bucyrus-Erie 2 yd. shovel. Both engines are powered with Allis-Chalmers diesels, rated 257 and 165 hp respectively. In stepping up the hauling capacity to the mill the existing fleet of five 5-yd. Koehring Dumptors was augmented by the purchase of two new 10-ton Koehring Dumptors. Each new addition will double the capacity. These efficient hauling units which feature GM diesels, 4-71's for the 5's and 6-71's for the 10 tonners, haul their loads on the quarry floor to a 40-in. Cedar Rapids feeder with a manganese apron.

as well as the rate at which the mill's capacity is stockpiled is a problem being met with increased power and larger capacity. One of the two new Koehring 10-ton Dumptors is assigned to the mill, now taking twice the amount with each load. When visited by DIESEL PROGRESS a Scoopmobile with a 3½ cu. yd. bucket, using a 6-cylinder Cummins diesel was being tried out as a loader to increase the loading out capacity. Other dieselized equipment working on top to move the aggregate consisted of a P & H 1½ yd. shovel, and Caterpillar D8800 4-cylinder diesel; a ¾ yd. Lorain with a 4-71 GM diesel, using a clamshell. A Bucyrus-Erie 22-B one yard dragline with International UD-14 diesel also helped work the material on top. The pit cleanup tractor was a D4 Caterpillar.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

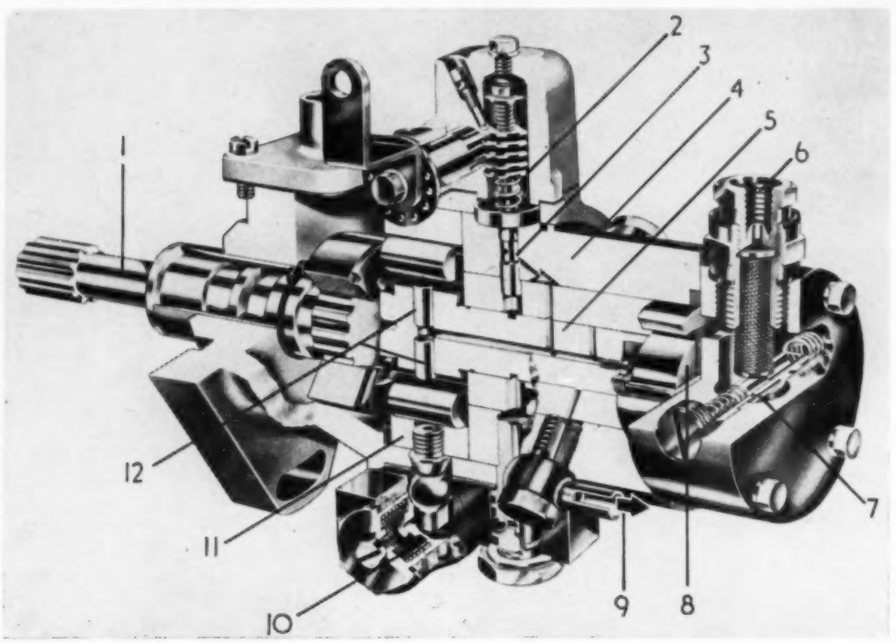
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

The C.A.V. Distributor Type Fuel Pump

C.A.V. Ltd. of Acton, England, has had in large scale production for some time now a distributor type of injection pump which is already fitted as standard equipment on a number of well-known diesel engines. This fuel pump is the result of extensive development work by C. A.V. in cooperation with the Hartford Machine Screw Co. in the United States, whose basic Roosa Master design has been utilized in a liscensee agreement. This agreement for the production and further development of this design has resulted in the C.A.V. DPA type pump designed specifically to meet the needs of British and European engine designers. Before the pump was placed into production in 1956, more than 100 units had been operated on proving trials in the agricultural and automotive fields for over 150,000 hrs., with most successful results. These included some on routine long distance, heavy duty goods haulage, running through all weathers and maintaining tight schedules throughout the year. Others were operating on taxis, private cars, tractors and contractors' plant. So satisfactory was the service experience that full scale manufacturing plans were implemented at the C.A.V. Rochester Works and to date more than 150,000 units have gone into service.

Briefly the pump may be described as a single cylinder, opposed plunger, inlet metering, distributor type unit. It contains no ball or roller bearings, no gears or highly stressed springs and it has the same number of working parts regardless of the number of engine cylinders it serves. Complete with its governor, the pump forms an oil-tight unit in which pressure is maintained, thus preventing the ingress of dust, water, etc., during operation. The parts operate in filtered fuel oil, and no special lubrication arrangements are therefore necessary. The problem of calibration—that is the balancing of the outputs of the several pumping lines one with another, necessary with all multi-element pumps—is non-existent with the DPA pump, as equality of delivery to each injector is an inherent feature of the design. Precise phasing between cylinders, and the functional sequences are also secured and are inherent, being determined by accurate manufacture, and cannot be maladjusted or altered during assembly of the pump.

It is ideally suited for high operating speeds, the reciprocating masses being small, and there being no return spring problem since the plungers are returned hydraulically. The pump may be fitted vertically or in any desired position from a flange mounting on the engine. The main features of the pump and the method of functioning are best seen by reference to the part sectional illustrations showing the pump with the hydraulic governor. It should first be noted that there are three main rotating units arranged on a common axis so that they rotate as one. These comprise a drive shaft, a pumping and distributing rotor, and a fuel transfer pump. The distributor rotor is driven by the drive shaft through splines, the shaft being carried in a sleeve in the base of the pump housing and carrying a further set of splines for coupling to the engine drive with the precise angular location necessary for timing. A pumping section and a distributing section make up the rotor, the distributing section being a close rotating fit in a stationary steel cylindrical body called the hydraulic head. The pumping section of the rotor is larger in diameter than the distributing section, and has a transverse bore or cylinder containing two opposed plain plungers; these are the pumping plungers.



Sectional view of DPA distributor pump with hydraulic governor. 1. Splined drive shaft. 2. Hydraulic governor. 3. Metering valve. 4. Hydraulic head. 5. Pumping and distributing rotor. 6. Fuel inlet connection. 7. Regulating valve. 8. Transfer pump. 9. High-pressure delivery connection. 10. Automatic advance device. 11. Cam ring. 12. Pumping plungers.

A stationary internal cam ring which is carried in the pump housing operates the plungers through rollers and shoes which are carried in slots in the periphery of the rotor flange. Normally the cam ring has as many lobes as there are cylinders to be served, the lobes being equally spaced round the circumference. The distributing section of the rotor contains a central axial passage which connects the pumping space between the plungers with ports which are drilled radially in the rotor and provide for fuel inlet and delivery. One radial hole in the rotor is the distributing port. As the rotor turns, the distributing port aligns successively with a number of outlet ports in the hydraulic head, from which the injectors are fed via external high pressure pipes.

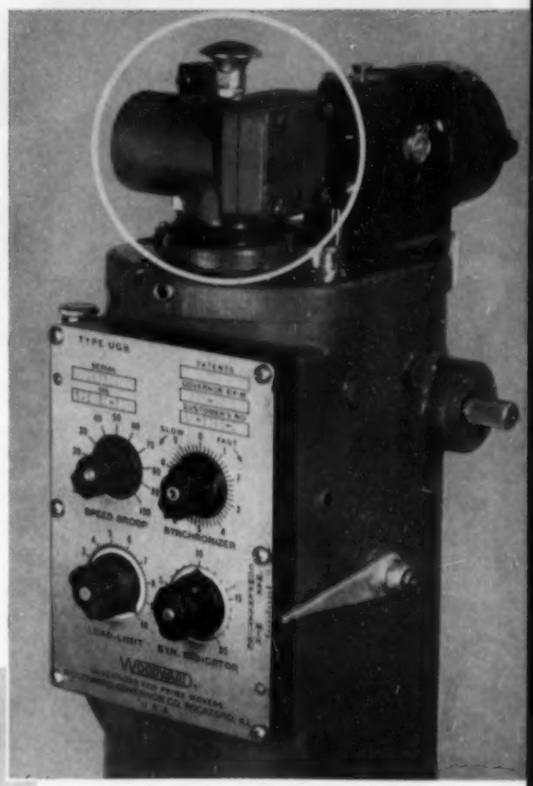
GOVERNOR INCORPORATES SHUTDOWN DEVICE

Two New Lightweight Controls Also Added By Woodward for Small Gas Turbines

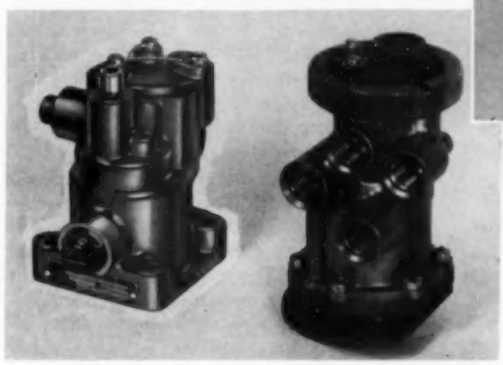
A NEW LOW lubricating oil pressure shutdown device has been developed for Woodward UG8 and UG32 hydraulic governors that is interchangeable with the standard UG8 and UG32 solenoid shutdown. It is a positive acting hydraulic device that can reduce linkage and simplify installation and maintenance. The lubricating oil shutdown is mounted on the governor cover in the same place as the solenoid shutdown and operates on the governor shutdown strap.

When starting the engine and before oil pressure has been built up, the manual reset knob must be lifted. This allows a small reset piston to latch and hold the shutdown rod in the "run" position until lubricating oil pressure has reached a certain value. At this point a larger shut down piston will disengage the reset piston from the shutdown rod at the same time as it, the shutdown piston, engages the shutdown rod. The lubricating oil shutdown device is now "armed" and a loss of lubricating oil pressure will cause the large piston to disengage from the shutdown rod, allowing it to operate on the governor shutdown strap and causing the governor to go to shutdown. Shutdown pressure is adjustable from 6 psi minimum to 26 psi maximum by means of an adjusting plug. The pressure required to disengage the manual reset latch ranges from 11 psi to 35 psi depending on the shutdown pressure setting.

Woodward has also announced that two new lightweight governors have passed rigid bench and field tests and are now available as production items. These are reduced size versions of previously proven controls and were developed for small gas turbine engines used to drive aircraft ground power units and other auxiliary support equipment. Their relatively small physical size makes them popular for applications where available space is at a premium and reduced weight a requirement.



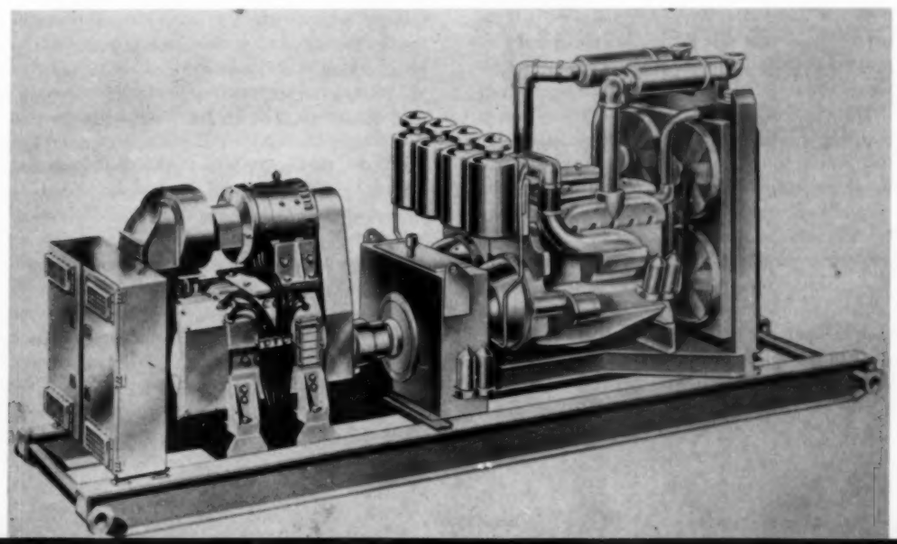
New shutdown device in circle for UG8 and UG32 governors is interchangeable with standard solenoid shutdown.



Gas turbine controls—the X1602 at left weighs 1.25 lbs., and the X1522 weighs 2.6 lbs.

SIMPLIFIED POWER PACKAGE FOR OILFIELDS

A NEW and greatly simplified Diesel-electric power package for medium depth oil drilling and work-over rigs is announced by Electro-Motive Division of General Motors. Electro-Motive, which made oil field history when it introduced a completely integrated diesel-electric power system for deep well drilling rigs in 1955, now offers a complete electric drive system matched with a 500 hp General Motors twin 110 diesel engine for smaller rigs. The electric transmission and control equipment has been so designed that it is adaptable to natural gas engines for areas where this type of fuel is in abundance. First showing of the new product, designated the SR-5, took place at the International Petroleum Exposition.



A number of features have been designed into the equipment as a result of the experience gained from 29 of its larger powered drilling rigs currently operating in the Texas-Louisiana Gulf Coast area. Simplicity has been the dominate factor for each component of the SR-5, resulting in faster rig up, unlimited rig arrangement, excellent portability, ease of control and low maintenance. The new electric power system basically consists of a skid mounted unit containing an Electro-Motive D49 generator coupled to a 500 hp GM diesel engine geared to operate at 1200 rpm. Generator control cabinet and engine controls are also mounted on the same skid. Starting with the basic drive a complete custom designed system can be built up with time proven components. A typical application would consist of two engine-generator sets, one motor control cabinet, 3 motors, and a driller's control. This arrangement would provide power for a draw works, draw works driven rotary and two mud pumps. Additional equipment may be easily incorporated as required.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Service Promotion

PROMOTIONAL, or merchandising efforts of a Service Department, necessary to insure the fullest use of the service facilities, are worth very serious consideration and should be planned as a complete program over a predetermined period of time. Many establishments miss the fullest possible effects of good merchandising by going about it in a haphazard manner and think about it only when they have time or when business conditions indicate that it needs a "shot in the arm." A well laid out promotional program can be expected to produce the necessary income to satisfy the requirements of a distributorship and justify the investment in the Service Department area, as well as the investment in tools, equipment, and training programs that will produce the skilled labor necessary for a quality service operation.

For a number of years, it was quite common for the Service Department to be thought of as the "necessary evil" in a distributor's operation, which was brought into the business and forced to exist because of engine and equipment owners' demands for a certain amount of service on products they had purchased. Developments in recent years have brought to light the fact that service is not only a valuable asset in establishing customer good will, which has a definite reflection on the sale of new products, but is also a very important source of revenue instead of the burden it was once considered to be. This is particularly true today with modern engines and equipment having complicated electronic or hydraulic controls, blowers, superchargers, turbo-chargers, torque converter drives, and other recent developments. With the realization that the modern Service Department can be both a high volume parts customer and revenue producing asset of any distributor's business, it is worthy of management's consideration to determine the many ways whereby the service operation may be promoted. Such planning will help produce increased service volume and insure the fullest use of the service facilities and the investment in service shop space.

Recognizing that the service commodity is highly intangible, somewhat on the order of an insurance policy, it is necessary that a sound talking point, or "something to promote" be developed. This talking point should be centered around the quality of service available, the completeness of service and what it will do for the purchaser. Oftentimes, a potential service customer may have his own repair and rebuild shop, and believe that he can perform the same type of service he could purchase from a distributor. To sell such customers on the superiority of the distributor's service, a promotional program should be developed to prove that such service has many things to offer beside parts and labor. Many engine distributors have experienced considerable success and high volume from this type of customer by guaranteeing the horsepower and performance of engines after overhaul. Some of these complete service operations, which include detailed inspection and quality control facilities as found in manufacturers' plants, are going even further by offering a "new engine" guarantee on engines overhauled in their shop.

One of the first things to be considered while planning the promotion of a service operation and determining the various ways and means of increasing the service volume, is to survey the potential in a territory and establish "surefire" methods to obtain this potential business. Very often a distributor's Sales Department may spend considerable time and money in developing a customer and obtaining the initial purchase order. An initial introduction of this type, to a distributor's operation and a product, may reduce the margin of profit on the initial sale. With such practices, it is extremely important that the customer will make repeat purchases without the profit reducing preliminaries of the initial sale. This is where the Service Department can prove its value to the business, as it is this department's responsibility to make sure that the original purchase operates satisfactory, does everything the Sales Department said it would do, and meet the customer's operating requirements. With these fundamental demands in mind, service must be promoted in a manner that will influence the customer towards the distributor's facilities to protect the operation of equipment. It must further be emphasized that the customer's welfare is the prime requisite of the Service Department. A realistic service promotion is one developed to influence every customer to become a booster as the most effective method of establishing a worthwhile reputation is by the "word of mouth" advertising through satisfied customers.

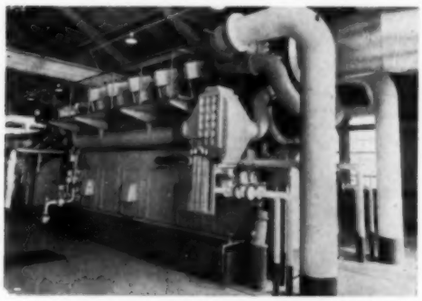
Both Buying and Selling Involved

The merchandizing of a service facility involves both buying and selling,—a supply of something to sell . . . someone to buy. To do this, there must be an established place of business, a commodity to sell, the ability to sell this commodity, and a planned method of selling. Generally, when we think of merchandizing, we merely think of selling something. Very seldom do we even consider the "buying side." Therefore, it is of utmost importance that we give considerable thought to the things a customer will buy. Various methods must be developed to influence a potential service customer and to convince him that he cannot obtain or find such complete, well planned quality service anywhere else. Assurance must be given that when a job is done, it is done right the first time. That all facilities, planned shop space, skilled labor, tools, equipment, training programs are planned with the customer's welfare in mind. Furthermore, it must be pointed out that no expense has been spared to assure the customer that quality service is available, and that by purchasing this service he can expect economical operation and the elimination of possible downtime.

Another consideration, when planning a service promotion campaign, is who are the consumers of the commodity? The answers to this can be selected from various owner groups such as: new engine and equipment owners—past equipment owners—fleet owners—contractors—etc. Besides determining who the potential customers are, it is important to figure the number, where they are located, and what is known about them. To find the answers to these questions, a list should be compiled which will include: (1) Current users' registration or ownership list, such as: a. owner's name and address. b. Types of equipment and models used. c. Total number of users. d. Total number of each type of equipment; (2) New and used engine and equipment sales records; and (3) List of all past and present service customers.

Compressor Contract Awarded

A 1½ million dollar order for six of its large type GMW gas engine compressors has been awarded to The Cooper-Bessemer Corp. by the Department of the Interior's Bureau of Mines. This announcement has been made public by Eugene L. Miller, president of Cooper-Bessemer, who added that the compressors are planned for the newest helium recovery plant at Keyes, Oklahoma. When completed, the Keyes recovery operation will be the fifth plant of its kind for extracting helium from natural gas. Similar plants already in operation by the Interior Department's Bureau of Mines are already located at Exell and Amarillo, Tex.; Otis, Kan.; and Shiprock, N. M. Up to a dozen additional helium recovery plants under consideration by the Bureau of Mines program will be necessary ultimately to fulfill projected reserves of helium to meet expected needs of the nation's missile and atomic energy programs, according to the Department of the Interior. In the government con-

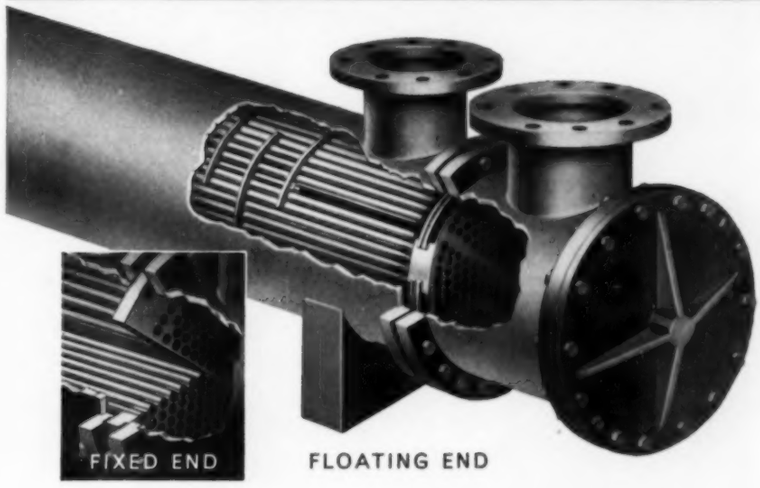


Cooper-Bessemer engine-driven compressor type GMWC, the type to be used at Keyes, Oklahoma, for recovery of helium in the government's current helium conservation program.

servation program, three billion cu. ft. of helium will be recovered that is now being wasted when natural gas containing the helium is burned as a fuel. The compressors to be furnished by Cooper-Bessemer for the gas recovery phase of the program will compress natural gas containing the rare helium to extremely high pressures for the purpose of separating the helium from the remaining natural gas. The natural gas will then be pumped into cross country gas transmission lines for delivery to market areas of the Midwest and East.

The annual consumption of helium in this country has increased over seventy times in the last twenty years to an all-high rate of 330 million cu. ft. per year. Although the yearly consumption is expected to increase at a further accelerated rate in the years to come, unfortunately no new domestic sources of helium have been discovered to keep pace with this consumption. About ten times the yearly consumption is actually wasted each year, authorities point out, in the normal burning of fuel gases now containing helium. Under the government conservation program, the major share of the helium to be recovered from fuel gases will be extracted by plants built and operated by private industry. The helium will then be sold in a guaranteed basis to the government. The proposed helium extracting plants will of necessity be located on helium bearing natural gas pipelines. The helium will be stored underground in government-owned Cliffside gas field near Amarillo, Tex.

PERFORMANCE THAT CREATES SATISFACTION!



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STEEL SHELL FLOATING HEAD • STRAIGHT TUBES

- Lantern gland type floating head permits free expansion and contraction and prevents mixing of fluids.
- Available with ⅜", ⅝" and ¾" O.D. bare tubes as well as ⅝" O.D. finned tubes. Diameters to 31".
- Standard materials—steel shell, admiralty tubes, alloy bolting. Special materials available to meet specific requirements.
- Ask for Bulletin HT-5.

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Over 75 years of service to industry

HEAT TRANSFER DIVISION

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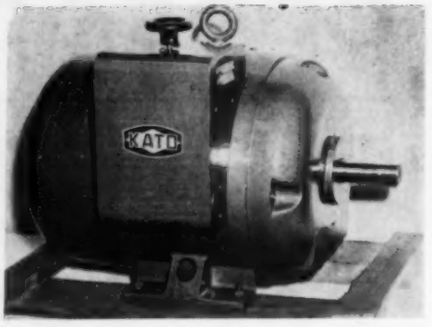
MACHINE COMPANY

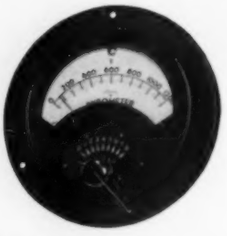
701 4th St. BELOIT, WISCONSIN

Kato Extends DC Generator Line

DC generators manufactured by Kato Engineering Co. are now available in sizes ranging from 500 watts to 40 kw with various voltages throughout the line. Primarily a manufacturer of 60 and 400 cycle ac generators, motor-generator sets and synchronous motors, the company's line of direct current machines was previously limited to a few standard dc machines and special applications. The improved, extended line includes 50 different dc outputs with other models in the engineering stage. Both shunt and compound wound units are available throughout the range of sizes, enabling the generators to be used for a wide range of applications, including battery charging, testing and operating dc appliances. The machine



illustrated is a 6 kw, 40/60 volt, 1800 rpm two bearing dc generator. It is shunt wound, permitting it to be used for battery charging and is of drip proof construction. Typical of other machines in the line, it has commutating poles, in this case four, in addition to the field poles which improves commutation as constant location of the commutating zone is maintained regardless of load changes. Brush sparking is greatly reduced and overall generator performance is improved. These machines provide dc current for cathodic protection which reduces underground pipe corrosion. Construction features include heavy cast endbells and frame, grease sealed ball bearings and single segment commutator bars. Laminations are punched from best quality dielectric steels. Coils are heavily insulated, banded, thoroughly impregnated with thermosetting varnish and baked, making the armature one solid homogeneous mass. Additional information is available from Kato Engineering Co., Mankato, Minn. (ITS NEW)



KEEP the power you bought with Alnor® PYROMETER protection

...on diesel or gas engine compressors

- **pumping**
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It's a simple fact: your power investment will pay more dividends when protected by an Alnor pyrometer system! At a fraction of the cost of your present maintenance bills, a rugged Alnor system gives you an accurate check of exhaust temperatures—warning in advance of cylinder overload...preignition...scaled jackets... clogged ports...detonation...faulty injection.

Alnor accuracy and dependability set the standard in the industry. More diesel and gas engines are delivered equipped with Alnor Pyrometers, because manufacturers as well as users know that Alnor protection means assurance of minimum fuel consumption per horsepower and elimination of most common-cause breakdowns.

There's an Alnor Pyrometer and thermocouple assembly for every installation. Send for Bulletin 4361. Illinois Testing Laboratories, Inc., Room 508, 420 N. LaSalle St., Chicago 10, Ill.

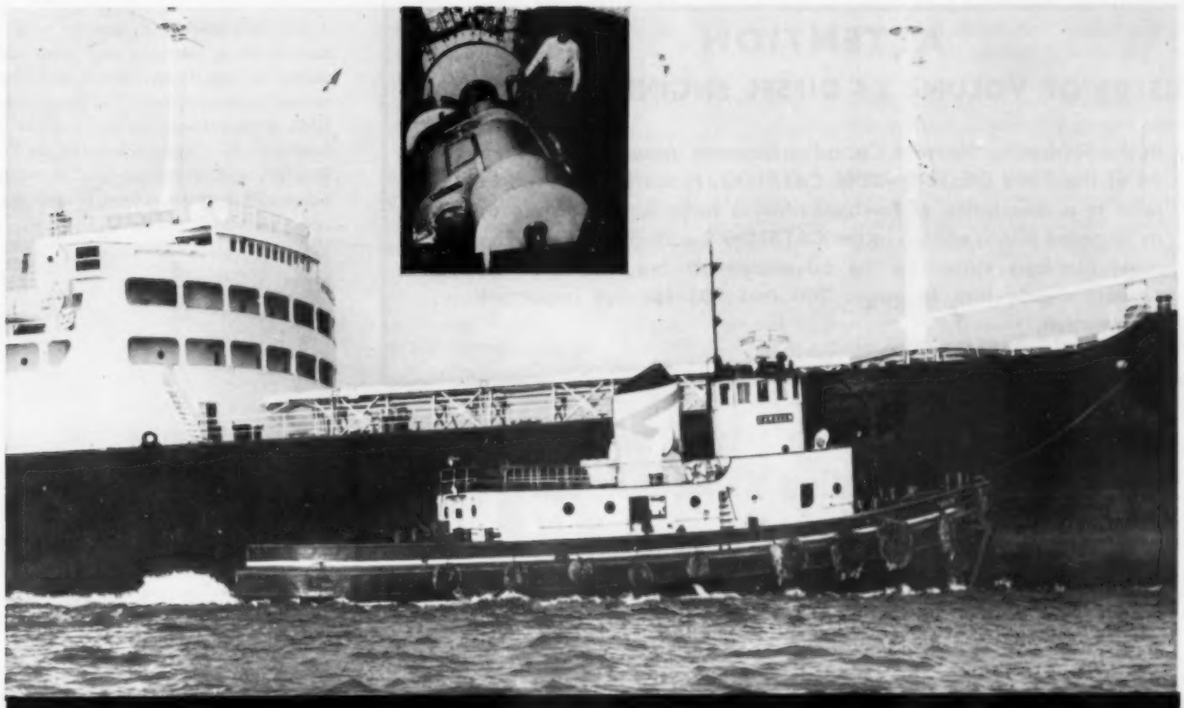
Alnor PRECISION INSTRUMENTS FOR EVERY INDUSTRY

AiResearch Turbocharger on Cat D8

Application of the model T1404 turbocharger on Caterpillar Tractor Co.'s new D8 series H tractor culminated a joint development program by The Garrett Corporation's AiResearch Industrial Division, Los Angeles, and Caterpillar. Features of the basic T14 turbo were integrated into an efficient unit through proper matching of the turbine, compressor and other components specifically to the D8's diesel engine. A one-piece precision casting of high temperature alloy GMR 235 is used for the turbine wheel, a radial inward flow type. The impeller on the compressor side is of a special aluminum alloy, also one-piece. It is of back-

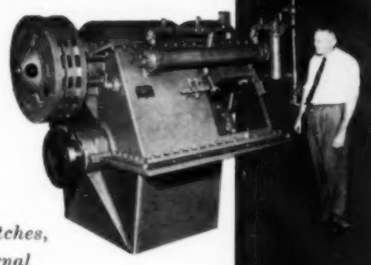
AiResearch model T1404 turbocharger, shown in lower left corner, is matched specifically to the diesel engine powering Caterpillar's new D8 series H tractor.

ward curved, outward flow, semi-shrouded design. To enhance the air cooled design of the turbocharger, the center housing is separated from the turbine housing with a stainless steel radiation shield. This prevents heat from the turbine housing being carried into the center housing bearings and oil supply. Pressure oil lubricated full floating bearings are used. This design decreases the relative velocity between the turbocharger shaft and the bearing, providing for increased bearing life, smoother operation, and tolerating greater magnitudes of rotating unbalance. In addition to a power boost for the D8's diesel engine, the higher pressure differential across the engine cylinders provided through turbocharging promotes better scavenging, lower exhaust temperatures, more complete burning of fuel with less smoke, and better engine acceleration with less smoke. The basic AiResearch T14 turbocharger, by use of various compressor and turbine components, has also been applied to Caterpillar's D9 Tractor, and the DW20 and DW21 wheel tractors. (ITS NEW)



"superior tugs . . . superior service"*

now with superior Sea-Master® *gears by* WESTERN GEAR



The Western Gear Sea-Master Model 112 PCMR reverse and reduction gear used in the CAROLYN is equipped with Wichita air clutches, sleeve type journal bearings with removable caps, quill shaft drive, multiple shoe-type thrust bearings, oversize coolers, completely self-contained lube oil system, fabricated steel housings and heat treated alloy steel double helical gearing. Standard units are available in vertical or horizontal offset arrangement for single engine drives up to 5000 hp. Multiple engine arrangements permit transmission of as much as 20,000 hp to a single propeller shaft.

why is this CURTIS BAY TUG *so highly maneuverable?*

Converted from steam to an ALCO Model 251-B, 12-cylinder, turbocharged 1600 hp diesel, the 95-ft. tug CAROLYN is equipped with a Sea-Master PCMR 4:1 ratio reverse and reduction gear, driving a 102-inch bronze propeller.
In a crash reverse demonstration from full ahead, the tailshaft stopped 6 seconds after initiation and was turning at full astern 14 seconds after initiation. The CAROLYN became dead in the water in approximately 30 seconds and rapidly proceeded in the reverse direction. Learn more about Sea-Master Marine Gears . . . send for Bulletin 5905.

*THEME OF CURTIS BAY ADVERTISING PROGRAM.

WESTERN GEAR CORPORATION

Industrial Products Division • P.O. Box 126, Belmont, Calif.

Please send Bulletin 5905

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ATTENTION

USERS OF VOLUME 24 DIESEL ENGINE CATALOG

In the Fairbanks, Morse & Co. advertisement appearing on page 94 of the 1959 DIESEL ENGINE CATALOG, readers are asked to refer to a description of Fairbanks-Morse turbo-supercharging of its opposed piston engine in the CATALOG'S editorial section. The page numbers stated in the advertisement are incorrect and readers should turn to pages 200 and 201 for this important information.

FUEL INJECTION EQUIPMENT DIVISION OF

LUCAS ELECTRICAL SERVICES, INC.

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Joseph Lucas (Canada) Ltd. *Head Office:* 11 Davies Avenue, Toronto 8, Ontario
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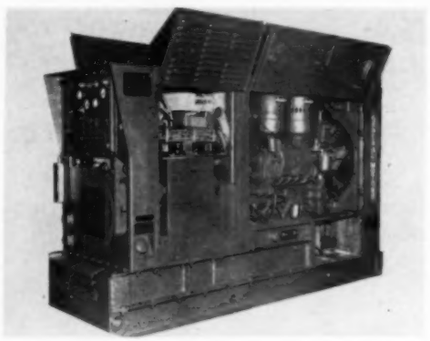
AP 929

Specialized Generator Set

A new light-weight generator set which meets the most exacting tolerance regulation standards required by the Armed Forces and other critical non-military operations has been announced by GM's Detroit Diesel Engine Division. The unit, developed in conjunction with the Engineering Research and Development Laboratories of the Corps of Engineers at Fort Belvoir, Va., is a 100



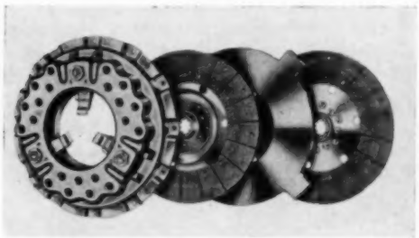
kw, 3-phase 50/60 cycle, 208-240/416-480 volt unit operating at 1500 and 1800 rpm. Driven by a six-cylinder series 71 GM diesel engine, the unit weighs only 5800 lbs. which is up to 4400 lbs. lighter than other units of comparable standards and capacity. Attained in the new unit is an extremely low transient reactance of .14 which reduces starting voltage dips to a minimum and a low negative sequence impedence of .11 providing the ultimate in voltage balance. Features of the unit are an electrical load sensing governor, a static exciter and main field regulator, and either local or remote starting and stopping controls and winterization for starting and operating in temperatures as low as minus 65° F. The unit is shock resistant and radio suppressed. The overall dimensions are 106 in. in length, 36 in. in width and 61 in. in height. An illustrated brochure describing these units can be obtained by writing the Detroit Diesel Engine Division, General Motors Corp., 13400 W. Outer Drive, Detroit 28, Mich. (ITS NEW)

Diesel Forestry Patrol Boat

Tongass Ranger, new 61 ft. steel patrol vessel for Alaska duty of U. S. Forest Service, turns up a pretty 11 knots during trial run on Puget Sound. A D353 Caterpillar with 290 hp at 1,225 rpm has 2.19-1 Twin-Disc hydraulic reverse and reduction gear to swing a three-blade 48 x 32-in. propeller. Auxiliary equipment includes a three-kilowatt Onan diesel generator set for 110-volt output. The second of two sisterships valued at $120,000 each, the *Tongass Ranger* was delivered in mid-March by her builders, Western Boat Building Corp.

Lipe-Rollway Introduces Two-Plate DPB Clutch

Lipe-Rollway Corp. has introduced a 14 in. two-plate DPB direct pressure heavy-duty clutch to fulfill the requirements of heavy diesel engines in on-highway vehicles now in operation. Made of rugged light weight construction in keeping with the lighter metals being used in tractors currently on the market, the two-plate unit is recommended for engines developing up to 735 ft. lbs. gross



torque. Torque rating: static 1,135 ft. lbs., maximum. The dry disc, direct pressure clutch has a facing area of 428 sq. ins. with unit pressure up to 26.5 psi. Maximum release bearing load is 600 lbs. at full release. Friction-free internal linkage permits top mechanical efficiency. Intermediate plate is of extra rugged, close grain high tensile iron that resists warpage and center plate is lug-type, providing more driving area. Drive mechanism is simplified assuring more perfect alignment between plate and engine flywheel; driving pin alignment is completely eliminated. Positive retraction of intermediate plate during disengagement is possible through cylindrical type springs and results in easier shifting. Pedal ratio of 13:1 is recommended. The 14 in. two-plate DPB is available with rigid or dampener-type driven disc assemblies with spline sizes of 1½ and 1¾ in. 10C S.A.E. For further information, write Lipe-Rollway Corp., Clutch Division, Syracuse, New York. ITS NEW

B. B. Williams Retires, New Officers Elected at Cooper-Bessemer

B. B. Williams

At its 126th Annual Stockholders' Meeting at Mount Vernon, Ohio, the retirement of B. B. Williams was announced to the shareholders of The Cooper-Bessemer Corp. Also announced were the elections of C. G. Cooper and J. E. Brown to the positions of Vice President and International Director, and Vice President and Treasurer, respectively of The Cooper-Bessemer Corp. Honorary Chairman of Cooper-Bessemer's Board and Chairman of the Executive Committee, Williams' retirement landmarks 58 years of active association with the Corporation. Mr. Williams, 82, in the past has been President and Chairman of the Board of Directors, heading up one of the oldest and largest builders of engines and compressors in the country.

C. G. Cooper

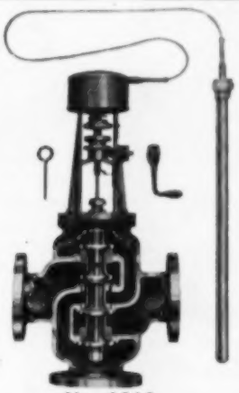
J. E. Brown

In addition to his new capacity as Vice President and International Director, C. G. Cooper serves the posts of President and is a Director of Cooper-Bessemer International Corp., Cooper-Bessemer of Canada, Ltd., and Cooper-Bessmer, S.A., a Swiss Company with offices at The Hague, Netherlands. In his new position, C. G. Cooper is responsible for the integration and organization of these worldwide operations as well as the manufacturing, application and sale of all Cooper-Bessemer products outside the United States. Licensees presently producing Cooper-Bessemer engine and compressor machinery are Harland & Wolff, Ltd., Belfast, Ireland; Termomeccanica Italiana, La Spezia, Italy; Societe Forges et Ateliers du Creusot, Paris, France. The election of Brown to his new post highlights 32 years of service in a financial capacity with Cooper-Bessemer. During this time, he has been Secretary and Treasurer of the Company, has personally directed the financial aspects of Cooper-Bessemer's long-range expansion program at both the Mount Vernon and Grove City manufacturing facilities. Brown also holds the positions of Director, Vice President and Treasurer of Cooper-Bessemer International Corp. and Cooper-Bessemer of Canada, Ltd.

Controls

...the *LIFE* of Your Engine

Whatever type of internal combustion engine you build or operate, chances are excellent there's a Fulton Sylphon control to help guarantee top efficiency with less maintenance . . . at lower cost! One-source manufacturing, outstanding quality and performance, field engineering assistance across the nation . . . to give you maximum *life* from your engine!



No. 1010 Temperature Regulator

For water or oil; controls flow of cooling water to maintain jacket water or lube oil at correct temperature. Automatic or manual-crank operation. Valve sizes ½" to 6".

No. 1075 Pressure-Operated Valve

Stops engines by cutting off fuel supply and venting fuel system. Prevents damage due to low lube pressure, high jacket water temperature, overspeed. Used with No. 530.

No. 28 Vacuum Switch

On engines using paper air filter, cuts replacement cost . . . signals replacement need with light or horn. Ends filter inspections, premature discards, smoking exhaust; cuts fuel consumption.

No. 1280 Temperature Regulator

All-in-one control . . . detects temperature changes in cooling water and operates to maintain exact engine temperature for optimum performance. Also for lube oil temperature control. Valve sizes 2" to 6".

NEW!

Switch at right now available in UL-approved explosion-proof model

No. 539 Temperature-Pressure Switch

4-way safety: sounds alarm, flashes warning light, operates pilot or stops engine if oil pressure drops or cooling water temperature reaches danger point. Integral bulb type.

No. 530 Fuel Shut-Off

Kills engines immediately if jacket water temperature exceeds safe limit, or lube oil pressure drops too low. Alarm optional.

Write for Catalog H

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tenn.

Florida Diesel News

By Ed Dennis

ON her maiden voyage, the 203 ft. *Inagua Cloud* carried as deck cargo, a model 4500 Manitowoc speed crane and six Cummins dieselized Oshkosh 30 yd. dump trucks for Moa Bay, Cuba. The new vessel is powered by a pair of D397, series D, Caterpillar diesel engines; West India Shipping Company is the new owner.

TWO model 40 six cylinder Superior diesel generating sets with 250 kw Marathon generators will be installed at Cojo Key. This is another link in the Eglin Gulf Test Range Stations of the BoMar Missile program.

FLORIDA-Georgia Tractor Co. delivered, to the Meekins Rock plant, west of Fort Lauderdale, a T. D. 18 crawler tractor with a six cylinder International 105 drawbar hp diesel engine and a T.D. 24 tractor with a 200 hp International diesel and torque converter.

AT Fort Myers Beach six of the Layco Shrimp trawlers were repowered with model D342 Caterpillar diesel engines rated 190 hp and Caterpillar 3:1 hydraulic r&r gears; from Shelley Tractor & Equipment Co.

THE *F. E. No. 42*, a 140 ft. guided missile base supply vessel, operated by Pan American Airways out of Brazil to Ascension Island, is powered by a pair of General Motors V6 diesels, model 278A with Falk 2:1 r&r gears and air clutches plus two model 3-268, 100 kw Delco generators.

AT Indian River City, the Thompson & Street Construction Co. took delivery of a model 3600 Manitowoc with a model NHRS Cummins diesel rated 320 max hp at 2100 rpm.

THE 46 ft. cabin cruiser *Red Fox* of Miami was repowered with a pair of Volvo MD47 Penta diesel engines rated 82 bhp at 2500 rpm and Borg-Warner 2:1 hydraulic r&r gears. They replace two 145 hp gasoline engines, by the J. Frank Knorr Co., of Miami, Florida.

SHELLEY Tractor & Equipment Co. supplied two D337 Caterpillar 310 hp diesel engines for power of fire pumps at the new Pratt & Whitney plant in West Palm Beach along with three D311 series H 30 kw Caterpillar diesel electric sets.

HUTCHENSON Brothers at Pompano Beach had a model 387-C-18 P&H diesel, rated 90 hp at 1800 rpm with Rockford clutch, installed to supply power for their G. & H. 14000 gpm low lift irrigation pump.

HONDURAS bound with four DW21 Caterpillar two wheel tractors (300 hp) and No. 470, 25 cu. yd. scrapers plus a D8 tractor (191 hp), was *Inagua Arrow*, owned by the West India Shipping Co.; propulsion for the vessel is provided by a pair of D375 Cats.

TWO Mercedes-Benz model ON312, each rated 79 hp at 2400 rpm and Capital 1.5:1 hydraulic r&r gears were installed in a schooner by Ravenswood Marine of Fort Lauderdale.

CITY of Wauchula had a 12 cylinder Fairbanks-Morse model 38D8⅛ opposed piston diesel generating unit installed with a 1300 kw Fairbanks-Morse generator.

PHOTO Reduction Laboratory building at Eglin Air Force Base will have a model 40SX8 turbocharged Superior diesel engine rated 712 hp at 900 rpm installed with a 500 kw 480 volt General Electric generator.

GENERAL Motors 2-71 with a GM power takeoff and an 8 in. Stang water pump was installed on a four wheel trailer by the Rental Machinery Co. of Miami to be used on sewer construction jobs. This firm has prefabricated about six similar installations on trailers using the two, four and six cylinder series 71 General Motors diesels.

METZGER Industries of Miami supplied a six cylinder Ford marine diesel engine model Y330 rated 100 shp with Paragon reduction gears and a Rockford power take-off to Travis Baily, Fulton Boat Yard, Rockport, Tex.

GENERAL Motors dieselized equipment recently acquired by Florida contractors included a model LS-98 Link Belt Speeder with a GM 4030C diesel for Weekly Paving Co. of Hallandale, a 43-M Marion dragline with a 4082 GM diesel for Intercoastal Dredging Co., Fort Lauderdale and a Marion power shovel with a 3055-C for Everhart Engineering Co., Fort Lauderdale.

HERCULES diesel model DJXR rated 92 hp with a Roosa-Master fuel pump powered the model HH Payloader tractor shovel that went to W. T. Price, and the Gulf Stream Race Track took delivery of an H. U. D. Payloader with a DIX-6-272 Hercules rated 106 hp and a Borg and Beck 2:1 r&r gear.

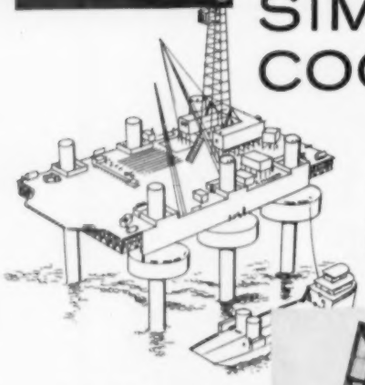
PETTER diesel rated 3 bhp powers the Winpower auxiliary generator on the newly launched *Sherry Ann* of Fernandina Beach. For main propulsion a model D342 Caterpillar marine diesel engine with 3:1 Snow Nabstedt r&r gears.

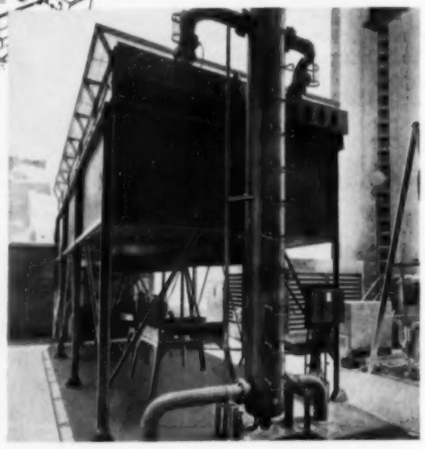
MODEL NH180 Cummins diesel engines were installed in a Diamond T 923 hiway tractor for W. W. Horn of Sanford, in a 4400 White dump truck for the B&D Sand Co. of Jacksonville and in a Brockway T2 for Ben & Franks Produce Co. of Vero Beach. These diesels are rated 180 hp at 2100 rpm.

FINN Machinery Co. is the distributor in the Tampa, Jacksonville and Miami areas for the Curtiss-Wright line of road construction machinery. This new line of machinery uses both Cummins and General Motors diesel engines for power.

HC HORIZONTAL CORE UNIT by Young

SIMPLIFIES COOLING of POWER UNITS on Giant Offshore Drilling Barge...





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5. Jones and Laughlin Bradford, Pennsylvania
6. J. R. Meek Company Tulsa, Okla., Houston, Texas
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Mid-West Diesel News

By **L. H. Houck**

TO Boulder Sanitarium and hospital, Boulder, Colo., a 150 kw Allis-Chalmers generator set using the Allis-Chalmers diesel, from Power Equipment Co.

FISH Engineering Co., Houston, has purchased a 100 kw Delco generator, powered with a Deutz A12L air-cooled diesel.

LOHMAN & Johnson Drilling Co., Great Bend, Kan. a Cummins 600 hp VT-12-B1 for powering a National drilling rig, from Cummins Sales & Service, Fort Worth.

INLAND GM Diesel, Inc.,, Milwaukee, has delivered a GM Model 3031C power unit to the Heil Co., for use in an agricultural application.

PETER Kiewit Sons, Co., Omaha, purchased four A2L 514 Deutz air-cooled diesels for use in powering Vibro-Plus machines.

MATCHED pair of new model GM 8V71 marine engines to the Burger Boat Co., Manitowoc, Mich., for installation in a pleasure craft. Each unit is rated at 336 hp at 2300 rpm. Delivery was by Inland GM Diesel, Inc., Milwaukee.

NEBRASKA Motor Transportation Co., Omaha, has repowered an IHC DD205A with a 175 hp JT-6-B from Cummins Mid-West Co., Omaha.

CUMMINS Illinois Engines, Inc., Chicago, has delivered a Cummins NH-180 to J. P. Hollerich Co., LaSalle, Ill., for repowering a White 4464D.

HAYES Freight Lines, Chicago, a Cummins NH-220 for repowering an IHC DCOF-405, from Cummins Illinois Engine Sales, Chicago.

WHITE Eagle Oil Co., Tulsa, Okla., is using a Deutz A3L 514, running on crude oil, for operating a Gardner mud pump.

CONSUMER Co., Racine, Wis., has repowered an American locomotive crane with a new GM 6-71, delivered by Inland GM Diesel, Inc., Milwaukee.

CUMMINS NH-180 to Robert Knoll, Woodstock, Ill., for repowering a White 4464TD, from Cummins Illinois Engines, Inc., Chicago.

PAIR of Deutz SA8L 614 engines to H. R. Sand Associates in Dallas, for powering a 64 ft. house boat being built in Houston by Port Houston Iron Works. Boat is also to be equipped with Deutz air-cooled automatic demand start generator sets using F3L 712 engine.

CUMMINS 175 hp JT-6-B to Ernie Cambridge, St. Louis, for installation in an IHC RD-205-A, from Cummins Mo. Diesel Sales Corp., St. Louis.

PAUL Nickless, Williams, Ind., 190 hp Cummins HRF-6-B, for installation in an Autocar DC-7564T from Cummins Diesel of Indiana, Inc., Indianapolis.

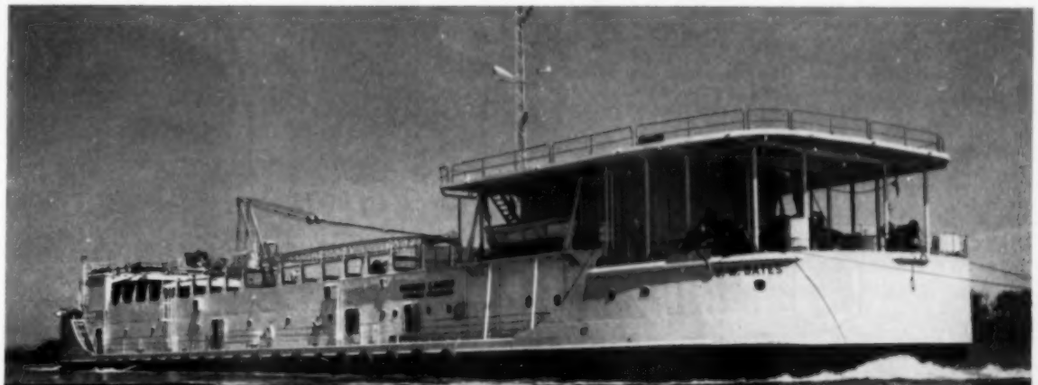
NORMAN Jones, Washington, Ind., has repowered an IHC DCO-405L with a Cummins NH-220, from Cummins Diesel Sales of Evansville, Ind.

CITY of Barron, Wis., a Cummins JN-6-BI for installation in an Austin-Western 88-H grader, from Cummins Diesel Sales, Inc., St. Paul.

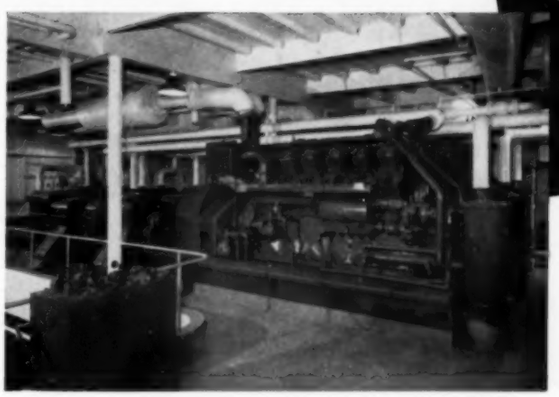
SCHMIDT Construction Co., Arvada, Colo., recently purchased a 125 kw Allis-Chalmers generator set for use in a rock crushing operation. This set was powered with the new Model 16000 Allis-Chalmers diesel. Sale by Power Equipment Co., Denver.

READING & BATES Offshore Drilling Company

OFFSHORE DRILLING TENDERS



have **WAUKESHA** *Turbocharged* **DIESELS**



(above) Drilling tender J. W. Bates uses (left) three WAUKESHA Model VLRDBS Turbo-Supercharged DIESELS— 12-cylinder, 60-degree vee, four cycle, 8½ x 8½-inch bore and stroke, 5788 cu. in. displacement, with counterbalanced crankshafts. Send for Bulletin 1663.

Reading & Bates Offshore Drilling Co., of New Orleans and Tulsa, have two drilling tenders, the *J. W. Bates* and *George M. Reading*—260′ long; 54′ wide; molded depth, at sides, 16′3″. The tenders operate offshore, one in the Gulf of Mexico, the other in the Gulf of Persia, at a distance of 40-75 miles. Both use Waukesha V-12 Turbocharged Diesels.

Pictured above are the tender *J. W. Bates;* and its three VLRDBS Waukesha V-12 Turbocharged Diesels driving the National Supply Company's largest mud pumps (No. 2-G-1000) through a three-section National gyrol compound with two-speed drive.

An official of Reading & Bates says, "The Waukesha V-12 Turbocharged Diesels, through their dependability and economical operation have earned the confidence and approval not only of the drilling crew personnel but of the entire Reading & Bates organization."

416

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The WITTE 100RDA Diesel Engine-Generator Unit

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Its low profile (33″) makes the Witte 100 Engine, which powers this unit, outstanding in either stationary or mobile applications. The horizontally-opposed cylinders provide inherent balance to make it smooth in operation and stable in performance. It has proved its DEPENDABILITY in the demanding railway field, where LOW FIRST COST yet exclusively-engineered railway features are necessary. MINIMUM MAINTENANCE ATTENTION is required with . . . 1200 hours between oil and filter changes . . . auxiliary fuel oil system, with day tank . . . brushless 12½ KW generator. It gives LARGE ENGINE PERFORMANCE with small engine economy.

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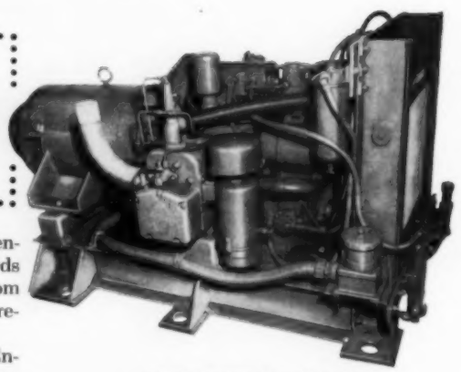

Brief Engine Specifications

Bore and Stroke	4″ x 4″
Cycle	4
Displacement	Cu. in. 100
Speed	rpm 1800
Horsepower: Continuous	18
Maximum (Bare Engine)	23.7
Height	inches 33
Width	inches 40½
Length (Approximately)	inches 66

USS **Witte Engine Works**
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Dresser Names New Clark Head

F. W. Laverty

Mr. J. B. O'Connor, president of Dresser Industries, Inc., has announced the appointment of F. W. Laverty as president of Clark Bros. Co., Olean, New York. Clark Bros., one of the world's leading manufacturers of compressors and gas turbines, is one of the original companies which merged to form Dresser Industries, Inc. Mr. Laverty has been executive vice president of the Olean firm since 1953, and previous to that had been sales manager. Mr. J. N. MacKendrick, president of Clark Bros. Co. until the present time, was simultaneously appointed chairman of the board. Mr. MacKendrick has been with Clark Bros. since 1928, and was named president of the firm in 1953. As board chairman, he will continue to headquarter at Clark's executive offices in Olean. In this capacity he replaces C. Paul Clark, who has been given the post of honorary chairman. One of Laverty's first acts was to name Joseph J. Rosecky to succeed him as executive vice president. Mr. Rosecky came to Clark in 1957 as vice president in charge of operations.

J. N. MacKendrick

J. J. Rosecky

Alco Opens Eastern Warehouse

Alco Products, Inc. has formally opened a new 71,500-square-foot warehouse serving railroad and diesel-engine customers throughout the East and overseas. The warehouse, at 5901 N. Tonnelle Ave., stocks a $3½ million inventory comprising more than 7,200 different items, and annual shipments are expected to reach $10 million. The facility employs 65 persons. Rail service for the building is provided by a spur running from the New York Central's nearby Flexi-Van yard, and the warehouse features a truck-loading dock with electrically-adjustable levelers to accommodate three tractor trailers. Inventory at the warehouse varies from 10,000 lb. diesel-engine blocks to lock washers and cotter pins stored in drawers by the thousands. The lighter material is stored on pallets stacked on 1,920 pallet racks, or in 5,100 smaller storage bins. Heavy items are stored in open areas around the periphery of the building interior. Orders received at the warehouse for immediate delivery are shipped the same day, and routine shipments are made within 48 hrs. The building's location near the East's major rail terminals, and its proximity to Hoboken and other Port of New York shipping facilities helps make faster deliveries possible. The building, replacing facilities formerly located in Schenectady, N. Y. and Atlanta, Ga., serves railroad and stationary and marine-engine customers along the East coast and overseas.

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Michigan-Ohio News

By **Jim Brown**

W. F. MILLER Ford Industrial Engine Sales of Birmingham, Mich. has had a model 330 Ford diesel installed in a Ford F-800 auto transport truck for Don Godfrey of Pontiac, Mich. The installation is a custom job and one of several recently completed with the Ford 330 diesel. Because of the success of these recent installations, Ford now offers a standard installation kit for the model 330.

MILLER Equipment Co. of Detroit has just delivered a Michigan model 280 tractor dozer to Presque Isle Corp. of Alpena, Mich. The new Michigan dozer is powered by a Cummins NTO6B-1 turbocharged engine and is equipped with special quarry tires.

WOLVERINE Tractor and Equipment Co. of Detroit and Grand Rapids has recently delivered a 30,000 lb. model 160 Galion motor grader to Washteneau County. The new grader is powered by a Cummins diesel engine and will be used for general road maintenance work.

GERRITT Dosthumous of Wayne, Mich., a road and bridge construction contractor has accepted delivery on a new Super 100 Austin Western grader powered with a model 3-71 GM diesel engine. The sale was made by R. G. Moeller Co. of Detroit.

MODEL 440 ICD John Deere crawler tractor powered by a GM 2-53 Detroit Diesel engine was recently sold to Kilroy Construction Co. of Wyandotte by the R. G. Moeller Co. of Detroit. The new John Deere crawler is equipped with dozer blade, and weighs 8,000 lbs.

CONTRACT totaling $1,861,441 was awarded recently by Colonel Peter C. Hyzer, District Engineer, Detroit District Army Corps of Engineers, to the Erickson & Lindstrom Construction Co. at Flint, Mich. for construction at Kinross AFB near Sault Ste. Marie, Mich. Work is expected to begin immediately.

LEACH Bros. Excavating at Kalamazoo, Mich. has accepted delivery on a model TS-160 Allis-Chalmers scraper unit. The scraper was purchased from Earle Equipment Co. of Detroit and is powered by an A-C TDS-516 diesel rated at 155 hp. Struck capacity for the TS-160 is 7 cu. yds.

CHEVROLET Flint Mfg. Div. of Flint, Mich. has accepted delivery on an Allis-Chalmers model HD6G tractor with a Tractomotive 1½ yd. TS6 shovel attachment. The new tractor also has a Tulsa 35 ton winch, a wooden push block, an angle-type dozer blade and a 4 cylinder HD344G Allis-Chalmers diesel engine rated at 79.5 gross hp. The tractor was purchased from Earle Equipment Co. of Detroit and will be used as an "all-purpose" machine.

BAY CITY Shovels, Inc. of Bay City, Mich. has announced the availability of a new 40-ton capacity CraneMobile, model 610-T8440. The integrally designed Bay City-built 8 x 4 carrier features removable outrigger beams and supports, air brakes on all wheels, power steering, and variable speed transmission with 12 speeds forward and 3 reverse.

LORAIN model L 26 with a ¾ yd. bucket and powered by a Caterpillar D315 diesel engine was recently delivered to Raff & Dexter of Lansing, Michigan by R. G. Moeller Co. of Detroit. The Lorain can be set up as a crane, dragline, hoe or clamshell. It has a 60 ft. boom, 12 ft. 6 in. crawlers with 29 in. treads and a 15 ton lifting capacity.

PRESQUE Isle Corp. at Alpena, Mich. is now using a new tractor in its quarry operation . . . an Allis-Chalmers model HD21A purchased from Earle Equipment Co. of Detroit. The new A-C is equipped with a 21HD hydraulic bulldozer attachment, a "U" bowl moldboard, and is powered by one of the new 21000 series Allis-Chalmers diesels.

THEW Shovel Company, Lorain, Ohio, has announced a new 30 ton 8x4 Lorain Moto-Crane. The carrier for this new Moto-Crane is designed and built by Lorain for the specific size and type of shovel-crane. A distinctive feature of the MC-430 carrier is a rocker-beam mounted front bogie that doubles the front axle carrying capacity.

JULIUS Porath & Sons of Detroit has accepted delivery on a new model 4030C GM diesel engine for his Northwest model 6 crane. Sale was made by Peninsular Diesel Inc. of Detroit.

R. G. MOELLER Co. of Detroit reports the sale of a Super 200 Austin-Western grader. The grader is powered by a GM 3-71 diesel engine and was sold to Wayne County Road Commission in Michigan.

EARLE Equipment Co. of Detroit has sold two Allis-Chalmers HD6E diesel tractors to the L. A. Davidson Co. bridge and road building contractors of Lansing, Mich. The new tractors were equipped with 6DE hydraulic dozer attachments and powered by model HD-344 Allis-Chalmers diesel engines.

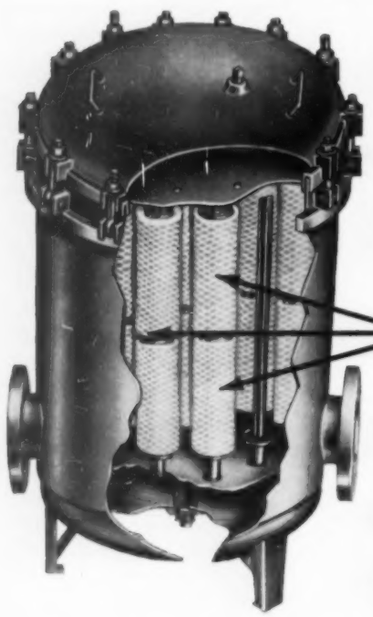
LAKE SHORE, Inc., Service & Supply Div., Iron Mountain, Mich., has been appointed an excavator-crane, hydro-crane, bucket and parts distributor by Bucyrus-Erie Co. South Milwaukee, Wis. Lake Shore's territory includes the Upper Peninsula of Michigan and the northern Wisconsin counties of Ashland, Iron, Vilas, Forest, Florence and Marinette.

JOHN DEERE model 4401C crawler with a dozer blade was sold by the R. G. Moeller Co. of Detroit to Bissonette & Son of Flint, Mich. The new dozer is powered by a 331¼ hp GM 2-53 diesel engine rated at 1850 rpm. Weight of the John Deere with dozer blade is 7,217 lbs.

APPOINTMENT of Cyril J. Burke, Inc., Detroit and the Don F. Nickel Equipment Co., Grand Rapids, as distributors for Delmag diesel pile hammers has been announced. Delmag diesel pile hammers are light-weight and require no boilers, air compressors, coal, water, nor ignition systems or high pressure injection systems. Weight of a Delmag hammer is approximately half that of a conventional steam hammer.

MICHIGAN Tractor & Machinery Co., Detroit and Grand Rapids, has announced that they now have available the new No. 619 wheel tractor—No. 442 scraper combination, a major addition to the 1959 Caterpillar product line. This new machine makes available a Caterpillar-built two-wheel rubber-tired haul unit in the same size class as the company's DW15 wheel tractor. The new No. 619 tractor is powered by a 225 hp, turbocharged diesel engine.

NEW Michigan model 280 tractor-dozer is now being broken in at Alpena, Mich. for the Huron Portland Cement Co. The Michigan was sold by Miller Equipment Co. of Detroit and features a turbocharged Cummins NT06B-1 engine, special quarry tires, and a dozer blade with tilt and pivot cylinders.



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West Coast News

By James Joseph

UNION Model P6 supercharged diesel engine (1100 hp at 400 rpm) has been installed aboard the trans-Pacific liner M/V *Dona Nati*, the customized layout arranged to permit continued use of existing Mitsubishi generator and flywheel.

AIR-COOLED Deutz SA3L 514 (48 hp at 1800 rpm) with 2:1 reverse reduction has gone into a 28 ft. gilnetter operating from Anchorage, Alaska.

SOLD to Star Machinery Co., Seattle, for use at Everett General Hospital, a 2-cycle GM 62406RD power unit, rated 150 kw at 1800 rpm, as standby power unit.

REPOWERING a Peterbilt rig for Bellflower, Calif.'s United Hay Co. is a Cummins NH-220 diesel.

TO Tacoma's Western Boat Builders, a GM 2-cycle aluminum marine engine, model 4071D (151 hp @ 2300 rpm max.), for installation in a 62 ft. sailboat.

DELIVERED by Seattle's Modern Motors, Inc., to Alan M. Coles, a GM Model 62207 with 4-valve head, rated 227 hp continuous at 1800 rpm, for his fishing vessel *Joann*, working Puget Sound and Alaska.

SIMPSON Logging Co. Grisdale, Wash., has purchased a Cummins NH-220-BI for repowering a Kenworth rig. Sale by Cummins Diesel Sales of Washington, Inc.

FOR Puget Sound Dredging Co.'s towboat *Tom*, two GM marine diesels, model 62207 RD, with 3.7:1 reduction, rated 227 hp continuous each at 1800 rpm. Boat works Alaskan waters.

EIGHT additional White Superior natural-gas fueled Superior 8G825 engines (500 hp at 860 rpm) are being installed by City of Long Beach (Calif.) waterflooding project. Four are add-on to existing pump plant. Four others, operative by July, will man new plant.

RAHIER Trucking Co., Yakima, Wash., has taken delivery of a Cummins NRT 335 hp diesel to repower a Kenworth truck.

FOR M. Madsen, Seattle, a GM marine model 62206RD with 4.5:1 reduction, for halibut boat *Ilene* working Alaskan coast.

SITKA, Alaska's Rudolph Sarvela has taken delivery of a GM marine Model 3072C, rated 68 hp continuous at 1800 rpm, for his fishing vessel *Myrth*. Sale by Seattle's Modern Motors, Inc.

DELIVERED to Los Angeles contractor Jerry Artukovich, two Lister LD-1, 3.5 hp at 1800 rpm diesels for repowering pump diaphragms. Sale by Industrial Engine Service.

TO C. M. York, El Monte, Calif., a Cummins NH-220 for repowering his Peterbilt 351. Sale by Cummins Service & Sales, Los Angeles.

SOLD to Thomas H. Ireland, Myrtle Creek, Oregon, two Cummins 290 hp NHS-6-B engines for repowering Kenworth CD-523's. Sale by Cummins Diesel Sales of Oregon, Inc.

INSTALLED in new tuna clipper *Elsie A*, launched by San Diego's National Steel & Shipbuilding Corp., as auxiliary power . . . two Caterpillar D-342-C turbocharged generator sets.

FOR use on Arizona project, Shepherd Machinery Co. has sold one of its big 22,000-lb. M-371-A Integral Tandem rippers, pulled by a D-9.

ANOTHER Shepherd M-371-A Integral Tandem ripper—whose 160,000-lbs. of concentrated power replaces conventional blasting—has gone to Merritt Chapman & Scott for work on Panama Canal widening project. Sold with the ripper was a D-9.

DELIVERED to Merrifield Trucking Co., Anaheim, Calif., a Cummins NH-220 for repowering a Kenworth rig (sale by Cummins Service and Sales, Los Angeles).

ROSE Hills Memorial Park, Whittier, Calif. has taken delivery of a Caterpillar D-9 equipped with a Shepherd M-488 Super-U dozer blade, for ground leveling. Blade is 16'11" wide, 6'8" tall.

Solar Licenses Perkins To Manufacture Engines

One of England's largest engine manufacturing firms has been granted exclusive license to manufacture and sell Solar gas turbine engines abroad, Herbert Kunzel, president of Solar Aircraft Co., has announced. The company, F. Perkins Ltd., Peterborough, England, has formed a new sales subsidiary, Perkins Gas Turbines Ltd., with exclusive license to sell the Solar turbines in Europe, Africa and the British Commonwealth with the exception of Canada. Currently, Perkins is manufacturing Solar 50 hp Mars gas turbines, and has plans to begin manufacture of the company's 70 hp Titan gas turbine and 170 hp T-150 gas turbine during the coming year. Mr. Kunzel said that the British firm has rights to sell in the specified area all gas turbines designed and manufactured by Solar, including the 500 hp Jupiter engine and a new 1250 hp Saturn engine, currently being manufactured only in the United States. Perkins Gas Turbines Ltd., new subsidiary of F. Perkins Ltd., was formed when Perkins acquired all share capital of Sugg-Solar Ltd., formerly licensed by Solar to manufacture Mars gas turbine engines, Kunzel said.

Engine Control Brochure Available

Minneapolis-Honeywell has just published a new bulletin on diesel engine control technology. Illustrated with photographs, dimension drawings, and system drawings, this 28 page brochure covers all controls produced by Honeywell of the diesel industry. While those described are principally for stationary engines, the data is equally applicable to locomotives, trucks, mobile machinery and engines using other fuels. For a copy write to Minneapolis-Honeywell, Wayne and Windrim Aves., Philadelphia 44, Pa. (ITS NEW)

Twin Disc Appoints Beaton at Rockford Plant

Mr. Donald E. Beaton has been named Director of Manufacturing for the Twin Disc Clutch Company's Hydraulic Division in Rockford, Illinois. Announcement of the promotion was made by Twin Disc President John H. Batten from the company's main offices in Racine, Wis. Mr. Beaton has been Assistant General Manager of the Twin Disc Hydraulic Division since 1952. Prior to that time he was factory manager of the Thompson Products Company's Accessories Division. He holds a B.S. degree in Administrative Engineering from Cornell University and an M.B.A. degree in Industrial Engineering from Harvard University.

Models from 40 to 400 h.p. Gas or Diesel

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a *complete*, easily installed, marine power and steering package

Harbormaster Outboard Propulsion and Steering Units are complete marine power packages, ready for immediate use. Everything is included . . . fuel tank, battery, steering mechanism, even the hold-down bolts. Mount, put in fuel, start, and you're off with exceptional power and maneuverability.

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Please send me New Catalog giving details and showing many photos of Harbormasters in action.
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Company.....
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Kerber and Wilson Promoted by Commercial Filters

Commercial Filters Corp., Melrose, Mass., has promoted John Kerber and Herbert A. Wilson. Mr. Kerber has been named manager of the company's New York office. His headquarters will be in Ridgefield, N. J., where a complete stock of filtration equipment will be maintained to facilitate customer service. A graduate of the University of Arizona, Kerber has been with the company's Chicago office for the past two years. Mr. Wilson has been appointed Eastern District Manager, with headquarters at the company's main office in Melrose. He will cover the entire Atlantic Coast. Mr. Wilson, who graduated from Northeastern University, has been with the company for the past eight years. Commercial Filters Corp. manufactures Fulflo Filters, Honan-Crane, Michiana, and Delpark filtration equipment for all types of industrial fluids.

One Millionth V Horsepower Produced by Cummins

M. M. Sundt Construction Co. has taken delivery of the One Millionth "V" horsepower built by Cummins Engine Co. The engine supplies 600 hp for a Michigan tractor-dozer which is push-loading a fleet of 375 hp Michigan scrapers also Cummins powered, picking up a payload per scraper at a rate up to 1 ton per second. Sundt is averaging a 35 ton payload. The one millionth Cummins "V" horsepower is in a 600 hp Cummins VT-12 engine. Officials of Cummins and Clark Equipment Company were on hand as the huge dozer went into service near Tucson. Cummins officials were C. J. Wilhite, manager of construction sales for Cummins Engine Co., Columbus, Ind., and Paul O. Miller, president of Cummins Arizona Diesel. Clark officials were Wendell V. Richards, assistant sales manager; Marshall O. Nystrom, Western district manager; and Leigh M. Jones and R. B. George, both of Western Machinery Co. The dozer is operating 15 miles east of Tucson, where Sundt has a $1 million contract with the Arizona State Highway Dept. to build 5.3 miles of two-lane highway between Tucson and Benson, Ariz. The project requires the moving of more than 700,000 tons of material.

Snow-Nabstedt Names Northwest Representative

To further the sale of S-N Gears in the states of Oregon, Washington and Alaska, The Snow-Nabstedt Gear Corp. has recently appointed a manufacturer's representative, The A. H. Nelson Co., of Seattle, Wash. The owner, Arthur Nelson, will work closely with engine distributors, naval architects and shipyards. The present local S-N distributors will be responsible for parts and service, and still may be contacted for S-N marine transmission equipment. In effect, therefore, The A. H. Nelson Co. will help the manufacturer in obtaining sales and technical information from the field. Mr. Arthur H. Nelson has been known for many years in the Northwest marine trade. He has in the past been associated with Jules Engine and Equipment Co. as Gray Marine distributor. He has also acted as factory representative for Kermath Manufacturing Co. and Universal Motor Co. Among the companies which The A. H. Nelson Company presently represents are Kittell Muffler and Engineering Co., Yates-American Machine Co., Winpower Corp., Kainer and Co.

Ceramic Coating of Piston Heads Covered in Brochure

A new brochure, describing the Flame Ceramic Process of (among other characteristics) protecting metals against temperatures up to 5500° F., has been issued by Continental Coatings Corp., of 17706 Miles Ave., Cleveland 28, Ohio. Continental holds an exclusive license for the Flame Ceramic Process from Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill., developer of the process. This brochure, in three colors, describes the Flame Ceramic process, the Flame Ceramic torch, the Flame Ceramic powder feeder and the Flame Ceramic powders. It also deals with the current coating of the combustor of the ramjet engine for the supersonic Talos missile, now in production for the U. S. Navy with Continental Coatings FCA-11 aluminum oxide, and the coating of piston crowns, cylinder-heads and valves for EMD railway diesels of the Chicago & Eastern Illinois Railroad with rare earth oxides. The brochure also covers the origins of the Flame Ceramic process and its actual and potential applications.

ITS NEW

T. C. Tiearney Appointed by Indiana Commercial Filters Corporation

Mr. T. C. Tiearney has been appointed assistant sales manager of Indiana Commercial Filters Corp., Lebanon, Ind. In 1950, Tiearney joined the Honan-Crane Company which was later acquired by Commercial Filters Corp. During this entire period, he served in a sales engineering capacity on the complete line of CFC filtration equipment. Tiearney is a veteran of World War II and a graduate of the University of Illinois.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.

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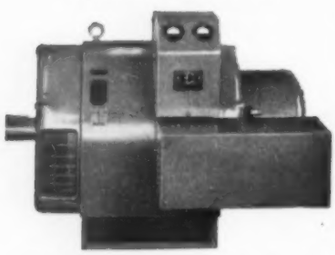

BEMAC is available in ratings of 10 thru 150 kw, 3 phase; 10 thru 100 kw, 1 phase; 1200 and 1800 rpm; 0.8 PF; 60 cycles; broad-range voltages of: 120/208-139/240 and 240/416-277/480 volts, 3 phase; 120/240 volts, 1 phase.

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Here is a generator that is *practically maintenance-free.* It requires no servicing other than an occasional bearing check. Efficient, reliable, ageless silicon diodes rectify the exciter a.c. to d.c., eliminating the need for commutators, brushes, and slip rings. There are many advantages:

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Starts big motors. Built-in voltage boost transformer makes big motor starting easier.

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Publication 255 tells how BEMAC Generators work. Write for a free copy and call your E-M Field Engineer.

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Maintenance Minder, Dept. P-3

5425 Second Ave., Des Moines, Iowa

Inland River Reports

By **A. D. Burroughs**

AMONG the new US-built boats serving in South America is the new *Perkeo*, now plying Amazon waters. The 63 x 18 ft. towboat, built by Bludworth Shipyard for Compania de Petroleo Ganso Azul, Ltd., Peru, carries a pair of Caterpillar engines, Model D375, with a total rating of 660 hp.

TWO new twin towboats for the Argentina firm, Flota Fluvial del Estado, Buenos Aires, are being readied by Ingalls Shipbuilding Corp. Each towboat, measuring 146 x 30 ft., will be equipped with two Caterpillar model D397 turbocharged engines rated 1000 hp total.

NUMBER of owner-built vessels are entering service, including the new 35 x 12 ft. craft christened the M/V *G. Ralph Romine*. Built by owners Louisiana Land and Exploration Co., New Orleans, 165 hp is supplied by a GM Detroit 6-71.

YANCY B. Turner Boatyard, Pine Bluff, Ark., completed their own towboat for their own fleet. Named the *Linda*, the 44 x 14 ft. craft has a rated 165 hp from a GM diesel engine.

TWO Caterpillar engines provide 1200 hp for the new towboat, *Bonus H*, a 90 x 22 ft. vessel constructed for and by West Tennessee Limestone Co., Nashville, Tenn.

FAIRBANKS-MORSE OP engines will provide 3200 hp for the larger towboat, a 156 x 35 ft. craft under construction now at St. Louis Shipbuilding and Steel Co., for Mid-South Towing Co., Tampa, Fla.

ST. LOUIS Shipbuilding and Steel Co., will round out a dozen diesel towboats built in less than five years for the Ohio River Co., with the delivery of a 90 x 28 ft. towboat. Scheduled for Illinois Waterway service with elevating pilothouse, power comes from two Caterpillar engines rated 740 hp.

TWO GM diesel engines, model 6071E, rated at 170 hp each supply power for the new *Hank*, 50 x 17 ft. towboat delivered by Missouri Valley Steel, Inc., Leavenworth, Kansas, to Massman Construction Co., Kansas City. The craft is a duplicate of the popular 1958 production, the *Mark*.

ANOTHER new towboat from Nashville Bridge Co., the *Harry A.*, is at work as a harbor and switchboat for owners, Cumberland River Sand and Gravel Co. The 50 x 20 ft. vessel has an engineroom equipped with two Caterpillar engines, each rated at 182 hp at 1600 rpm.

KOHLER 10 kw generator and two GM 6-110's team for power purposes on the new *Tanners Creek No. 2*. Completed by Barbour Metal Boat Works, St. Louis, the 51 x 18 ft. craft moves coal for Indiana-Michigan Electric Corp., Lawrenceburg, Ind.

ON the Ohio, coal trade increased, and two Enterprise-powered towboats were active for Island Creek Fuel and Transportation Co., Huntington. The 2560 hp *Raymond E. Salvati* was spotted often, as well as the older sister craft, the *I. F. Freiberger*.

BALDWIN-Lima-Hamilton-powered towboats of Ohio River Co., were out in the coal traffic on the Ohio as we noted the *Bob Benter, John J. Rowe, City of Huntington*, and *OVEC*.

MISSOURI River trade opened, and the *Etta Marie* was among the early arrivals at Omaha. The small, yet triple-screw, towboat, built in 1956 for Port City Towing Co. is powered with three Cummins engines rated 1800 hp total.

NEW twin-screw towboat is getting final inspection by builder Alabama Dry Dock and Shipbuilding Co., for owner Findley Towing Co., Tuscaloosa, Ala. The 64 x 24 ft. craft will have 1120 hp developed from Fairbanks-Morse OP engines.

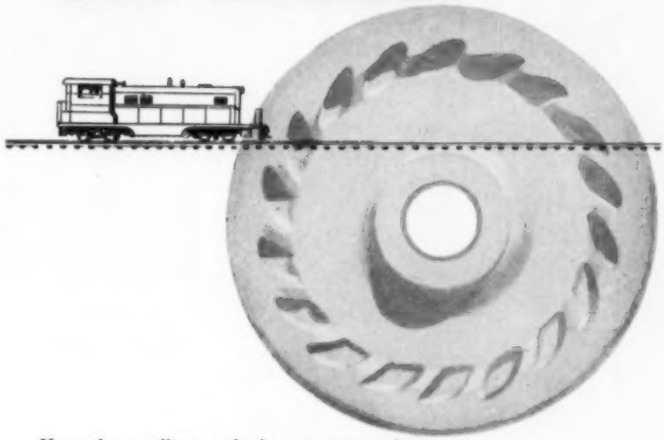
THE *William E. Brown*, built, owned and operated by Brown Marine Service, Pensacola, Fla., is in service in southern waters. The 50 x 16 ft. towboat carries two Caterpillar engines rated at 300 hp each for main push power, an Allis-Chalmers generator set, and Snow-Nabstedt reduction gears.

ALL-WELDED aluminum yacht, 55 x 14 ft., is being built at Diesel Shipbuilding Co., Jacksonville, Fla. The unique craft will be powered with two GM Detroit Model 6-71's, expected to produce a speed of 19½ knots.

Pakistan Orders 31 Alco Diesel Locomotives

Alco Products, Inc. announced today the receipt of an order from the Pakistan government for 31 turbocharged, 1800 hp diesel-electric locomotives. Mr. Manuel Alonso, vice president of foreign sales for Alco, said the order was worth more than $6 million. It was a repeat order from the Middle East nation for the streamlined, road-type DL-500 "World" locomotive. Alco's "World" unit has pioneered dieselization of railroads in several overseas nations, and is already in volume service in Spain, Peru, Argentina, Australia and India, in addition to Pakistan. The locomotives covered in the new order will be placed in service on the North Western Railways of Pakistan, with delivery scheduled to begin in July.

DIESELS ON STEEL?



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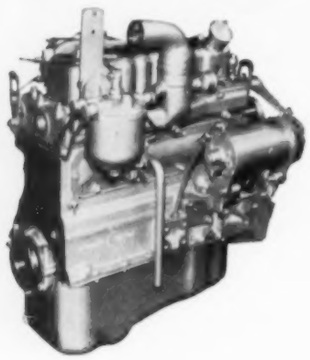

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  - light truck —42.3 bhp at 3600 rpm
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  - marine —31 shp at 2850 rpm
- Industrial model makes available a small four cylinder water-cooled diesel and opens up a new field in small industrial equipment.
- Automobile and light truck power units have been extensively tested in many different models of cars and trucks. On one test, after 20,000 miles, bore wear was only one thousandth of an inch.

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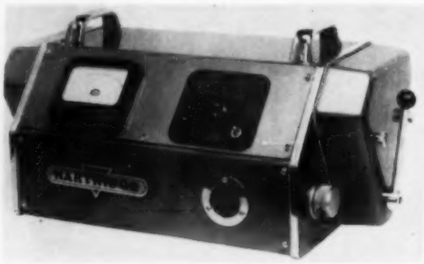
Meter Available for Measuring Diesel Exhaust Smoke Intensity

Measuring exhaust smoke intensity accurately is becoming a matter of increasing importance to the operator of diesel equipment because excessive smoke indicates operating inefficiencies which are reflected in engine performance, fuel consumption, and maintenance costs. Visual observation of exhaust smoke, which is the common practice, is often misleading due to varying backgrounds and atmospheric conditions. Because of this, there is great margin for error. And, standardization is almost impossible. An instrument for accurately and quickly measuring smoke is now made by Leslie Hartridge, Ltd., of London. Known as the Hartridge diesel engine exhaust Smokemeter, it is distributed in this country by Diesel Injection Sales & Service, Inc., of Norfolk, Va. The Hartridge Smokemeter provides instantaneous direct reading of smoke density from a dial. Its operation is based on the comparison of the density of an enclosed column of smoke with a similar column of clean air by means of a photo-electric eye. By using a standard filter supplied with each unit, it is possible to calibrate all instruments to a constant, and thus establish definite standards. A further advantage of the Hartridge Smokemeter is that it can be used to test engines in the field or on the highway as well as in the shop. Two models are available. One operates on a 12-volt battery; the other on standard AC current. Both models are completely and easily portable. Both can be connected to the engine exhaust system with ease.



White Introduces Waterflood Unit

A complete waterflood package—engine and pump with capacity up to 23,600 bbls. per 24 hour day—is now being marketed to the petroleum industry by the White Diesel Engine Division of The White Motor Co. The engine is a four cycle, six cylinder Superior G-510 that operates on natural gas or propane within the 190-400 bhp range. An improved combustion chamber with greater piston thrust provides high compression with marked fuel economy and low cost per horsepower hour. Directly connected to the engine through a flexible coupling is an Oilwell No. 368-P triplex pump operating with 5½ to 6½ in. plungers over the 600-840 psi range. Reduction is handled within the pump itself, eliminating the need for an intermediate gear. An Oilwell No. 358-P, with 3¼ to 5 in. plungers, may also be directly connected to the engine when higher working pressures (1020-2410 psi) are required; output of the No. 358-P is up to 13,970 bbls. per day. White Diesel reports a good match between engine and pump. The pump's requirements of 266 hp at 810 rpm continuous on

Wanted—Diesel Mechanic for Municipal Power Plant in Central Michigan. Experience required. Apply to City Manager, City Hall, St. Louis, Michigan.

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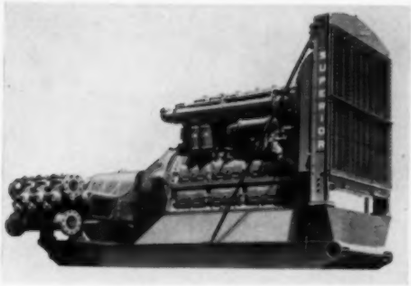

the input shaft of either model is well within the engine's range, and ample reserves are built into the engine for use on demand. White is able to offer a choice of automatic starting, remote controls, or any tailored control desired for this application. Equipped with a radiator for heavy duty oil field service, the compact unit is only 15 ft. long: without radiator, length is less than 14 ft. Additional information available from White Diesel Engine Div., Springfield, Ohio. (ITS NEW)

New Line of Small Filters For Multi-Purpose Applications

Specially-designed sizes of dry type air filters for use on hydraulic breathers and all types of small

air-cooled engines and air compressors have been announced by Purolator Products, Inc. Two models of the new small-size filters with replaceable paper elements—designated the AF-300 series—are adaptable for a wide variety of applications, including use as breather filters on diesels, large air-cooled engines, or hydraulic oil reservoirs (especially reservoirs subject to high volume changes), and as air cleaners on compressors, portable power units, and other types of small air-cooled engines. Measuring approximately 3 x 4¾ ins., the new dry type filter consists of a replaceable resin-impregnated paper element, preformed and accordian-pleated to provide greater filtering area; flows up to 15 cu. ft. of air per minute; and removes contaminants as small as 10 microns from the air stream. The addition of a fibrous wrap around the inside diameter of the paper element prevents oil blowback from saturating the filter medium. This greatly increases the life of the filtering element and makes the new series of filters particularly suitable for breather applications. When necessary, the paper element can be replaced quickly and easily. Differing only in size and style of outlet connection, two models of the new air cleaner/breather filters are available—the AF-300-7 with 1½ in. straight throat and the AF-300-8 with ½ in.-14 NPT external thread. For further information about the AF-300 filter series, write: Purolator Products, Inc., Rahway, N. J. (ITS NEW)

1959 DIESEL ENGINE CATALOG

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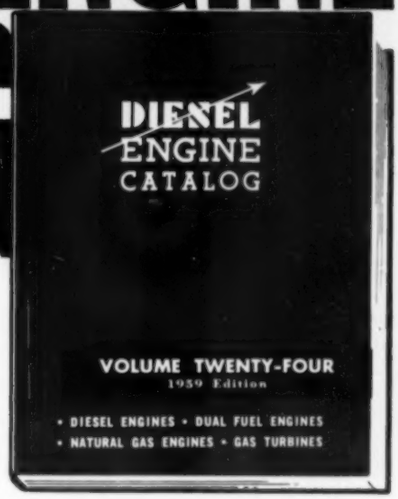

LOOK AT THE CONTENTS!

1. ENGINES — All major manufacturers of diesel, dual fuel, natural gas engines and gas turbines are represented in multiple page sections. Text is supplemented with specifications, power curves, photographs and sectional views.

2. TURBOCHARGERS and SUPERCHARGERS — This section of manufacturers is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.

3. TRANSMISSIONS — The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.

4. ACCESSORY EQUIPMENT — Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.

5. MARKET PLACE — A convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the fast growing Diesel Industry.

6. ADVERTISING — Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

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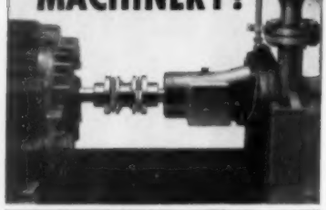

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EXTRA DEPENDABILITY

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